```
Dialog level 05.19.02D

Last logoff:  28sep07 12:18:30
Logon file405 01oct07 13:44:13
           *** ANNOUNCEMENTS ***
                   ***
NEW FILES RELEASED
***BIOSIS Previews Archive (File 552)
***BIOSIS Previews 1969-2007 (File 525)
***Engineering Index Backfile (File 988)
***Trademarkscan - South Korea (File 655)

RESUMED UPDATING
***File 141, Reader's Guide Abstracts
                   ***
RELOADS COMPLETED
***File 156, ToxFile
***Files 154 & 155, MEDLINE
***File 5, BIOSIS Previews - archival data added
***Files 340, 341 & 942, CLAIMS/U.S. Patents - 2006 reload now online
                                  ***
NEWS
Chemical Structure Searching now available in Prous Science Drug
Data Report (F452), Prous Science Drugs of the Future (F453),
IMS R&D Focus (F445/955), Pharmaprojects (F128/928), Beilstein
Facts (F390), Derwent Chemistry Resource (F355) and Index Chemicus
(File 302).
                   ***
 >>>For the latest news about Dialog products, services, content<<<
 >>>and events, please visit What's New from Dialog at <<<
 >>>http://www.dialog.com/whatsnew/.  You can find news about<<<
 >>>a specific database by entering HELP NEWS <file number>.<<<
>>>PROFILE is in a suspended state.
>>>Contact Dialog Customer Services to re-activate it.
* * *
SYSTEM:HOME
Cost is in DialUnits
Menu System II: D2 version 1.8.0 term=ASCII
                    *** DIALOG HOMEBASE(SM) Main Menu ***

 Information:
  1.  Announcements (new files, reloads, etc.)
  2.  Database, Rates, & Command Descriptions
  3.  Help in Choosing Databases for Your Topic
  4.  Customer Services (telephone assistance, training, seminars, etc.)
  5.  Product Descriptions

 Connections:
  6.  DIALOG(R) Document Delivery
  7.  Data Star(R)

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      /H = Help            /L = Logoff          /NOMENU = Command Mode


Enter an option number to view information or to connect to an online
 service.  Enter a BEGIN command plus a file number to search a database
(e.g., B1 for ERIC).
?
Terminal set to DLINK
                    *** DIALOG HOMEBASE(SM) Main Menu ***

 Information:
  1.  Announcements (new files, reloads, etc.)
  2.  Database, Rates, & Command Descriptions
  3.  Help in Choosing Databases for Your Topic
  4.  Customer Services (telephone assistance, training, seminars, etc.)
  5.  Product Descriptions

 Connections:
  6.  DIALOG(R) Document Delivery
```

```
  7.  Data Star(R)

    (c) 2003 Dialog, a Thomson business.      All rights reserved.

      /H = Help            /L = Logoff          /NOMENU = Command Mode


Enter an option number to view information or to connect to an online
 service.  Enter a BEGIN command plus a file number to search a database
(e.g., B1 for ERIC).
? b 347,350

       01oct07 13:44:17 User263760 Session D4960.1
            $0.00    0.265 DialUnits FileHomeBase
     $0.00  Estimated cost FileHomeBase
     $0.02  TELNET
     $0.02  Estimated cost this search
     $0.02  Estimated total session cost   0.265 DialUnits


SYSTEM:OS  - DIALOG OneSearch
  File 347:JAPIO Dec 1976-2007/Jun(Updated 070926)
         (c) 2007 JPO & JAPIO
  File 350:Derwent WPIX 1963-2007/UD=200761
         (c) 2007 The Thomson Corporation
*File 350: DWPI has been enhanced to extend content and functionality
of the database.  For more info, visit http://www.dialog.com/dwpi/.

      Set  Items  Description
      ---  -----  -----------
? edit
Editor entered
Name:           *NEW*
Total lines:        0
Line increment:    10
Last line:          0
INPUT:    10
? s task? ? or transaction? ? or job? ? or activity or activities or action? ?
or event? ?
INPUT:    20
? s s1(5n)(priority or priorities or importance or important or weigh??? or
scor??? or grade? ? or grading or rate? ? or rating or sort??? or order???)
INPUT:    30
? s deadline or due()date
INPUT:    40
? s (max or maximum or absolute or final or finale or last or effective or firm
or definitive)(2w)s3
INPUT:    50
? s s2(20n)(formula?? or algorithm? ? or procedure? ?)
INPUT:    60
? s s1(5n)(determin?????? or calculat???? or find??? or compute or computes or
computed or computing or measur? or defin??? or deriv???)
INPUT:    70
? s divid??? or division or mod
INPUT:    80
? s tmax or t()max
INPUT:    90
? set kwic 30
INPUT:   100
?

Returning to EDIT mode
EDIT:
? l
  10. S TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVITIES OR
      ACTION? ? OR EVENT? ?
  20. S S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
      WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RATING OR
      SORT??? OR ORDER???)
  30. S DEADLINE OR DUE()DATE
  40. S (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR EFFECTIVE
      OR FIRM OR DEFINITIVE)(2W)S3
```

```
  50. S S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
  60. S S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE OR
      COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? OR DERIV???)

  70. S DIVID??? OR DIVISION OR MOD
  80. S TMAX OR T()MAX
  90. SET KWIC 30
EDIT:
?
EDIT:
? r
Name:            *NEW*
Total lines:       9
Line increment:   10
Last line:        90
EDIT:
? l
  10. S TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVITIES OR
      ACTION? ? OR EVENT? ?
  20. S S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
      WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RATING OR
      SORT??? OR ORDER???)
  30. S DEADLINE OR DUE()DATE
  40. S (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR EFFECTIVE
      OR FIRM OR DEFINITIVE)(2W)S3
  50. S S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
  60. S S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE OR
      COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? OR DERIV???)

  70. S DIVID??? OR DIVISION OR MOD
  80. S TMAX OR T()MAX
  90. SET KWIC 30
EDIT:
?
EDIT:
? save temp ken
Temp SearchSave "KEN" stored
Exit from editor
? exs ken
           38718  TASK? ?
           60804  TRANSACTION? ?
           44801  JOB? ?
          448905  ACTIVITY
           40831  ACTIVITIES
          668576  ACTION? ?
          134752  EVENT? ?
      S1 1210449  TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR
                  ACTIVITIES OR ACTION? ? OR EVENT? ?
         1210449  S1
           62565  PRIORITY
            4743  PRIORITIES
           10179  IMPORTANCE
           46429  IMPORTANT
         1068087  WEIGH???
           38571  SCOR???
           76494  GRADE? ?
            9112  GRADING
          924959  RATE? ?
           17263  RATING
          277659  SORT???
          981435  ORDER???
      S2   33678  S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT
                  OR WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ?
                  OR RATING OR SORT??? OR ORDER???)
             988  DEADLINE
         1049077  DUE
           49416  DATE
             403  DUE(W)DATE
      S3    1378  DEADLINE OR DUE()DATE
          122732  MAX
          366774  MAXIMUM
           72658  ABSOLUTE
```

```
         236263  FINAL
           5061  FINALE
         114859  LAST
         621115  EFFECTIVE
          38849  FIRM
           3886  DEFINITIVE
           1378  S3
      S4     15  (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR
                 EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
          33678  S2
        1056853  FORMULA??
          58192  ALGORITHM? ?
         281544  PROCEDURE? ?
      S5    690  S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
Processing
        1210449  S1
        1326266  DETERMIN??????
         675683  CALCULAT????
         146251  FIND???
          20629  COMPUTE
          47242  COMPUTES
          86104  COMPUTED
         124335  COMPUTING
        1567594  MEASUR?
         943357  DEFIN???
         503333  DERIV???
      S6  80173  S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR
                 COMPUTE OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR?
                 OR DEFIN??? OR DERIV???)
         710440  DIVID???
         148593  DIVISION
           3866  MOD
      S7 788372  DIVID??? OR DIVISION OR MOD
           2004  TMAX
         628762  T
         122732  MAX
            383  T(W)MAX
      S8   2310  TMAX OR T()MAX
KWIC is set to 30.
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
? s ultimate(2w)s3 or ultimately()due
           8604  ULTIMATE
           1378  S3
              0  ULTIMATE(2W)S3
           7120  ULTIMATELY
        1049077  DUE
              4  ULTIMATELY(W)DUE
      S9      4  ULTIMATE(2W)S3 OR ULTIMATELY()DUE
?
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
```

```
            ING OR SORT??? OR ORDER???)
S3        1378   DEADLINE OR DUE()DATE
S4          15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
            EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5         690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6       80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
             OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
            OR DERIV???)
S7      788372   DIVID??? OR DIVISION OR MOD
S8        2310   TMAX OR T()MAX
S9           4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
?

? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
            IES OR ACTION? ? OR EVENT? ?
S2       33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
             WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
            ING OR SORT??? OR ORDER???)
S3        1378   DEADLINE OR DUE()DATE
S4          15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
            EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5         690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6       80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
             OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
            OR DERIV???)
S7      788372   DIVID??? OR DIVISION OR MOD
S8        2310   TMAX OR T()MAX
S9           4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
? s s2 and (s4 or s9)
           33678  S2
              15  S4
               4  S9
     S10       1  S2 AND (S4 OR S9)
? t/ti/1

 10/TI/1     (Item 1 from file: 350)
DIALOG(R)File 350:(c) 2007 The Thomson Corporation. All rts. reserv.

Control system for executing tasks within transactions - reduces longest
dead-line by increment to give new dead-line if initial maximum end-to-end
delay exceeds desired maximum end-to-end delay

Original Titles:
Steuerungssystem
Control system
Systeme de commande
Control system.

? t/3,k/1

 10/3,K/1     (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2007 The Thomson Corporation. All rts. reserv.

0009039153  - Drawing available
WPI ACC NO: 1998-597045/199851
XRPX Acc No: N1998-464652
Control system for executing tasks within transactions - reduces longest
dead-line by increment to give new dead-line if initial maximum end-to-end
delay exceeds desired maximum end-to-end delay
Patent Assignee: ROLLS-ROYCE PLC  (RORO)
Inventor: BATE I; BURNS A
Patent Family (2 patents,  26 countries)
Patent                          Application
Number          Kind   Date     Number          Kind   Date      Update
EP 880094        A2  19981125   EP 1998303886     A  19980518   199851   B
US 6151538       A   20001121   US 199881065      A  19980519   200101   E

Priority Applications (no., kind, date): GB 199710522   A  19970523
```

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
EP 880094	A2	EN	7	6	

Regional Designated States,Original: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI

Alerting Abstract ...end delay of the transaction is calculated using the initial deadlines D and the given **order** of the **tasks** . If the initial maximum end-to-end delay exceeds the desired maximum end-to-end...

...A new end-to-end delay is calculated using the new deadlines and the given **order** of the **tasks** . The alterations are repeated until the new end-to-end delay does not exceed the...

Original Publication Data by Authority

Original Abstracts:

A hybrid control system executes tasks within a transaction which is executed in a given **order** . The **order** in **which** the **tasks** are executed is **inversely** proportional to their deadlines. The deadlines are assigned an initial deadline D, an initial **maximum** end-to-end delay of the transaction is calculated using the initial deadlines D and the given **order** of the **tasks** . **The** deadline of **the** **task** with the largest deadline is reduced by an increment to give a new deadline and...

...A new end-to-end delay is calculated using the new deadlines and the given **order** of the **tasks** . These **steps** are repeated **until** the new end-to-end delay does not exceed the desired maximum end-to-end...

...A hybrid control system executes tasks within a transaction which is executed in a given **order** . The **order** in which the **tasks** are **executed** is inversely proportional **to** their deadlines. The deadlines are assigned an initial deadline D, an initial **maximum** end- **to** -end delay of the transaction is calculated using the initial **deadlines** D and the given **order** of the **tasks** . The deadline **of** the **task** **with** the largest deadline is reduced by an increment to give a new deadline and if...

...A new end-to-end delay is calculated using the new deadlines and the given **order** of the **tasks** . These steps **are** repeated until **the** new end-to-end delay does not exceed the desired maximum end-to-end delay.

Claims:

...system for executing tasks within a transaction, wherein: the tasks within the transaction must be **executed** in a given **order** and within given deadlines; the **order** in which the **tasks** are executed once **they** are released is inversely proportional to their deadlines; the transaction must be executed within a...

...the following way: i) each task is assigned an initial deadline D; ii) an initial **maximum** end- **to** -end delay of the transaction is calculated using the initial deadlines D and the given **order** of the **tasks** ; iii) if the initial **maximum** end-to- **end** delay exceeds the desired maximum end-to-end delay; a) the deadline of the task...

...a new end-to-end delay is calculated using the new deadlines and the given **order** of the **tasks** ; and d) steps a) to c) are repeated **until** the new **end** -to-end delay does not exceed the desired maximum end-to-end delay...

...within a transaction, wherein: the tasks within the transaction must be executed in a given **order** **and** within given **deadlines** ; the **order** in which **the** **tasks** are **executed** once they are released is inversely **proportional** to their deadlines; the **transaction** must be **executed** within a desired **maximum** end-to-end delay; and the deadlines used by the control system have been assigned...

...to-end delay of the transaction is calculated using the initial deadlines D and the **given** **order** of the **tasks** ; iii) if the initial maximum end-to-end delay exceeds the desired maximum end-to-end delay; a) the deadline of the **task** with the **longest** deadline is **reduced** by an increment to give a **new** **deadline** ; b) for each task, if the task following has an equivalent deadline, its deadline is...

```
...deadline; c) a new end-to-end delay is calculated using the new
deadlines and  the  given  order   of  the  tasks ; and d) steps a) to c)
are repeated until the new end-to-end delay
? s pn=us 20050022187
      S11        1  PN=US 20050022187
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
? s s2 and s11
           33678  S2
               1  S11
      S12        1  S2 AND S11
? t/e,k/1
>>>'E' not a valid format name
? t/3,k/1
```

12/3,K/1   (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0014783910 - Drawing available
WPI ACC NO: 2005-131593/ **200514**
XRPX Acc No: N2005-112815
Earliest deadline first scheduling method in real time multimedia applications, involves checking number of tasks to be scheduled, and processing predetermined tasks in shortest deadline first order from updated lowest priority
Patent Assignee: LG ELECTRONICS INC (GLDS)
Inventor: PARK M; PARK M J
Patent Family (8 patents, 35 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20050022187	A1	20050127	US 2003668320	A	20030924	200514	B
JP 2005044326	A	20050217	JP 2003334442	A	20030925	200514	E
EP 1522924	A2	20050413	EP 200321619	A	20030925	200525	E
CN 1577253	A	20050209	CN 2003160148	A	20030926	200532	E
KR 2005011559	A	20050129	KR 200350708	A	20030723	200535	E
KR 524763	B	20051031	KR 200350708	A	20030723	200680	E
JP 3890045	B2	20070307	JP 2003334442	A	20030925	200719	E
CN 1307531	C	20070328	CN 2003160148	A	20030926	200751	E

Priority Applications (no., kind, date): KR 200350708   A 20030723

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20050022187	A1	EN	8	4	
JP 2005044326	A	JA	12		
EP 1522924	A2	EN			

Regional Designated States,Original: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

Number	Kind	Lan	Pg	Dwg	Filing Notes
KR 524763	B	KO			Previously issued patent KR 2005011559
JP 3890045	B2	JA	13		Previously issued patent JP 2005044326

...real time multimedia applications, involves checking number of tasks to be scheduled, and processing predetermined tasks in shortest deadline first order from updated lowest priority
...NOVELTY - The tasks to be scheduled are checked. The priorities are allocated to the tasks . The current time of a computer system is updated as the lowest priority and the predetermined tasks are processed in a shortest-deadline-first order from the updated lowest priority on a...

Original Publication Data by Authority

Original Abstracts:
An EDF scheduling method comprising the steps of: checking the number of tasks to be scheduled; allocating priorities to the tasks ; updating current time as the lowest priority ; and processing the tasks in a shortest-deadline-first order from the updated lowest priority on a temporal axis. A time indicator for indicating the...

...An EDF scheduling method comprising the steps of: checking the number of tasks to be scheduled; allocating priorities to the tasks ; updating current time as the lowest priority ; and processing the tasks in a shortest-deadline-first order from the updated lowest priority on a temporal axis. A time indicator for indicating the...
Claims:
An EDF scheduling method comprising:checking the number of tasks to be scheduled;allocating priorities to the tasks ;updating current time as the lowest priority ; andprocessing the tasks in a shortest-deadline-first order from the updated lowest priority on a temporal axis...

...1. An EDF scheduling method comprising:checking the number of tasks to be scheduled;allocating priorities to the tasks ;updating current time as the lowest priority ; andprocessing the tasks in a shortest-deadline-first order from the updated lowest priority on a temporal axis....
Basic Derwent Week: 200514 ...
? ds

Set	Items	Description
S1	1210449	TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT- IES OR ACTION? ? OR EVENT? ?
S2	33678	S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT- ING OR SORT??? OR ORDER???)
S3	1378	DEADLINE OR DUE()DATE
S4	15	(MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR - EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5	690	S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6	80173	S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? - OR DERIV???)
S7	788372	DIVID??? OR DIVISION OR MOD
S8	2310	TMAX OR T()MAX
S9	4	ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10	1	S2 AND (S4 OR S9)
S11	1	PN=US 20050022187
S12	1	S2 AND S11

```
? s (S4 or s9) and s11
              15  S4
               4  S9
               1  S11
     S13       0  (S4 OR S9) AND S11
? s s3 and s11
            1378  S3
               1  S11
     S14       1  S3 AND S11
? t/3,k/1
```

14/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0014783910 - Drawing available
WPI ACC NO: 2005-131593/ **200514**
XRPX Acc No: N2005-112815
Earliest deadline **first scheduling method in real time multimedia applications, involves checking number of tasks to be scheduled, and processing predetermined tasks in shortest** deadline **first order from updated lowest priority**
Patent Assignee: LG ELECTRONICS INC (GLDS)
Inventor: PARK M; PARK M J
Patent Family (8 patents, 35 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20050022187	A1	20050127	US 2003668320	A	20030924	200514	B
JP 2005044326	A	20050217	JP 2003334442	A	20030925	200514	E
EP 1522924	A2	20050413	EP 200321619	A	20030925	200525	E
CN 1577253	A	20050209	CN 2003160148	A	20030926	200532	E
KR 2005011559	A	20050129	KR 200350708	A	20030723	200535	E
KR 524763	B	20051031	KR 200350708	A	20030723	200680	E
JP 3890045	B2	20070307	JP 2003334442	A	20030925	200719	E
CN 1307531	C	20070328	CN 2003160148	A	20030926	200751	E

Priority Applications (no., kind, date): KR 200350708 A 20030723

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20050022187	A1	EN	8	4	
JP 2005044326	A	JA	12		
EP 1522924	A2	EN			

Regional Designated States,Original: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

Number	Kind	Lan	Pg	Dwg	Filing Notes
KR 524763	B	KO			Previously issued patent KR 2005011559
JP 3890045	B2	JA	13		Previously issued patent JP 2005044326

Earliest deadline **first scheduling method in real time multimedia applications, involves checking number of tasks to be scheduled, and processing predetermined tasks in shortest** deadline **first order from updated lowest priority**

Alerting Abstract ...is updated as the lowest priority and the predetermined tasks are processed in a shortest- **deadline** -first order from the updated lowest priority on a temporal axis.USE - For scheduling earliest **deadline** first (EDF) algorithm in real time multimedia applications...

Original Publication Data by Authority

Original Abstracts:
...tasks; updating current time as the lowest priority; and processing the tasks in a shortest- **deadline** -first order from the updated lowest priority on a temporal axis. A time indicator for...

...tasks; updating current time as the lowest priority; and processing the tasks in a shortest- deadline -first order from the updated lowest priority on a temporal axis. A time indicator for...

Claims:
...tasks;updating current time as the lowest priority; andprocessing the tasks in a shortest- deadline -first order from the updated lowest priority on a temporal axis...

...tasks;updating current time as the lowest priority; andprocessing the tasks in a shortest- deadline -first order from the updated lowest priority on a temporal axis....
Basic Derwent Week: **200514** ...
? ds

Set	Items	Description
S1	1210449	TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT- IES OR ACTION? ? OR EVENT? ?
S2	33678	S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR

```
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
S12         1   S2 AND S11
S13         0   (S4 OR S9) AND S11
S14         1   S3 AND S11
? s s2(5n)(determin?????? or calculat???? or find??? or compute or computes or
computed or computing or measur? or defin??? or deriv???)
Processing
            33678  S2
          1326266  DETERMIN??????
           675683  CALCULAT????
           146251  FIND???
            20629  COMPUTE
            47242  COMPUTES
            86104  COMPUTED
           124335  COMPUTING
          1567594  MEASUR?
           943357  DEFIN???
           503333  DERIV???
      S15    4059  S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR
                   COMPUTE OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR?
                   OR DEFIN??? OR DERIV???)
?
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
S12         1   S2 AND S11
S13         0   (S4 OR S9) AND S11
S14         1   S3 AND S11
S15      4059   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
? s (s5 or s15) and s3
              690  S5
             4059  S15
             1378  S3
      S16      20  (S5 OR S15) AND S3
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
```

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              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
S12         1   S2 AND S11
S13         0   (S4 OR S9) AND S11
S14         1   S3 AND S11
S15      4059   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S16        20   (S5 OR S15) AND S3
? s s16 and s7:s8
               20  S16
           790553  S7:S8
     S17        0  S16 AND S7:S8
? s s10 or s16
                1  S10
               20  S16
     S18       20  S10 OR S16
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
S12         1   S2 AND S11
S13         0   (S4 OR S9) AND S11
S14         1   S3 AND S11
S15      4059   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S16        20   (S5 OR S15) AND S3
S17         0   S16 AND S7:S8
S18        20   S10 OR S16
? S s18 AND PY=1963:2003
Processing
Processing
               20  S18
         20251680  PY=1963 : PY=2003
     S19       13  S18 AND PY=1963:2003
? S s18 AND AY=1963:2003 AND AC=US
>>>One or more prefixes are unsupported
>>>  or undefined in one or more files.
Processing
Processing
               20  S18
         14060739  AY=1963 : AY=2003
          4696489  AC=US
```

```
     S20      12  S18 AND AY=1963:2003 AND AC=US
?
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
S12         1   S2 AND S11
S13         0   (S4 OR S9) AND S11
S14         1   S3 AND S11
S15      4059   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S16        20   (S5 OR S15) AND S3
S17         0   S16 AND S7:S8
S18        20   S10 OR S16
S19        13   S18 AND PY=1963:2003
S20        12   S18 AND AY=1963:2003 AND AC=US
? s s19:s20
     S21      16  S19:S20
? ds

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
S12         1   S2 AND S11
S13         0   (S4 OR S9) AND S11
S14         1   S3 AND S11
S15      4059   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S16        20   (S5 OR S15) AND S3
S17         0   S16 AND S7:S8
S18        20   S10 OR S16
S19        13   S18 AND PY=1963:2003
S20        12   S18 AND AY=1963:2003 AND AC=US
S21        16   S19:S20
? t/3,k/all

 21/3,K/1     (Item 1 from file: 347)
DIALOG(R)File 347:JAPIO
```

07122971 **Image available**
SCHEDULING METHOD IN SOFT REAL-TIME

PUB. NO.: 2001-350639 [JP 2001350639 A]
PUBLISHED: December 21, 2001 (20011221)
INVENTOR(s): TAKIZAWA YASUHISA
APPLICANT(s): ATR ADAPTIVE COMMUNICATIONS RES LAB
APPL. NO.: 2000-168950 [JP 2000168950]
FILED: June 06, 2000 (20000606)

...PUBLISHED: 20011221)

ABSTRACT

...tasks are scheduled, a higher priority is set to the one having a higher adaptive deadline , and the execution order of tasks is determined . When the tasks are executed, the adaptive deadline is set corrected) according to the communication waiting time obtained from the result of the execution of the tasks. Namely, the respective adaptive deadline of the tasks are renewed so that the communication waiting time is shortened. Thereafter, the execution order of tasks is renewed according to the adaptive deadline renewed every execution of the tasks.

21/3,K/2 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0014803040 - Drawing available
WPI ACC NO: 2005-150726/200516
Related WPI Acc No: 2004-118513
XRPX Acc No: N2005-127095
Task managing method for use in database server, involves automatically ascertaining that condition precedent in selected sequenced task has been completed before subsequent selected sequenced task is initiated
Patent Assignee: TASKSERVER INC (TASK-N)
Inventor: OLAPURATH J; SODLAPUR R; VLEMMINGS R
Patent Family (1 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20050022198	A1	20050127	US 1998108538	P	19981116	200516	B
			US 1999438446	A	19991112		
			US 2004755864	A	20040112		

Priority Applications (no., kind, date): US 1999438446 A 19991112; US 1998108538 P 19981116; US 2004755864 A 20040112

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20050022198	A1	EN	27	14	Related to Provisional US 1998108538
					C-I-P of application US 1999438446
					C-I-P of patent US 6678714

Original Publication Data by Authority

Claims:
...plurality of defined tasks that need to be completed to accomplish the desired process; automatically **sequencing the** selected certain **tasks** in an **order** in which the **tasks** need to be completed; automatically identifying the certain tasks that have a condition precedent; assigning a **deadline** date on each selected and sequenced task to be completed; automatically assigning each of the tasks to a **task** fulfiller; initiating a first task in said sequenced order; automatically monitoring the completion of said...

...is initiated; determining, by said automated task fulfiller, a preselected number of days before said **deadline** date that an assigned and sequenced task is outstanding; and automatically issuing a notification, by said automated task fulfiller, if the task fulfiller has not been able to complete the assigned task by the **deadline** date.

21/3,K/3 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0014310769 - Drawing available
WPI ACC NO: 2004-497925/200447
XRPX Acc No: N2004-393194
Sheet metal fabrication process scheduling method, involves determining if set of on time jobs does not exceed scheduled due dates and modifying set of on time jobs if set of on time jobs exceeds scheduled due dates
Patent Assignee: GRABENSTETTER D H (GRAB-I); OTEY D (OTEY-I); SIEMENS ENERGY & AUTOMATION INC (SIEI)
Inventor: GRABENSTETTER D H; OTEY D
Patent Family (2 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20040111173	A1	20040610	US 2002412305	P	20020920	200447	B
			US 2003665180	A	20030918		
US 7130706	B2	20061031	US 2003665180	A	20030918	200672	E

Priority Applications (no., kind, date): US 2002412305 P 20020920; US 2003665180 A 20030918

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20040111173	A1	EN	11	5	Related to Provisional US 2002412305

Original Publication Data by Authority

Original Abstracts:
...time delivery (OTD) of a fabrication process. A scheduling heuristic, referred to as Weighted Forward **Algorithm** (WFA), is applied to a set of fabrication **jobs** to reduce the **weighted** number of late delivery of a single machine with a setup. Certain exemplary embodiments can...

...jobs, a set of late jobs and a set of jobs to be scheduled; normalizing **job** set by **due date order** and processing requirements; and **determining** if the set of on time jobs will meet scheduled due dates, and if not...

...time delivery (OTD) of a fabrication process. A scheduling heuristic, referred to as Weighted Forward **Algorithm** (WFA), is applied to a set of fabrication **jobs** to reduce the **weighted** number of late delivery of a single machine with a setup. Certain exemplary embodiments can...jobs, a set of late jobs and a set of jobs to be scheduled; normalizing **job** set by **due date order** and processing requirements; and **determining** if the set of on time jobs will meet scheduled due dates, and if not...
Basic Derwent Week: 200447

21/3,K/4 (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0013938306 - Drawing available
WPI ACC NO: 2004-118513/200412
Related WPI Acc No: 2005-150726
XRPX Acc No: N2004-094691
Task management method in human resources department of company, involves automatically sending message to supervisor, if automated task fulfiller has not been able to complete assigned task by deadline date
Patent Assignee: TASKSERVER.COM INC (TASK-N)
Inventor: OLAPURATH J; SODLAPUR R; VLEMMINGS R
Patent Family (1 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 6678714	B1	20040113	US 1998108538	P	19981116	200412	B
			US 1999438446	A	19991112		

Priority Applications (no., kind, date): US 1998108538 P 19981116; US 1999438446 A 19991112

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 6678714	B1	EN	22	14	Related to Provisional US 1998108538

...to supervisor, if automated task fulfiller has not been able to complete assigned task by deadline date
...NOVELTY - A **deadline** date is assigned for each selected and sequenced task to be completed. The completion of...

...automatically. A message is sent to a supervisor, at preselected number of days before the **deadline** date, if the automated task fulfiller has not been able to complete the assigned task by the **deadline** date.

Original Publication Data by Authority

Claims:
...from the plurality of defined tasks that need to be completed to accomplish the desired **project** ;automatically sequencing the selected certain **tasks** in an **order** in which the **tasks** need to be completed;automatically identifying the certain tasks that have a condition precedent;assigning a **deadline** date on each selected and sequenced task to be completed;automatically assigning each of the tasks **to** an automated task fulfiller;initiating a first task in said sequenced order by said automated...
...task fulfiller;determining by said automated task fulfiller a preselected number of days before said **deadline** date that an assigned and sequenced task is outstanding; andautomatically issuing a notification by said automated task fulfiller if the automated task fulfiller has not **been** able to complete the assigned task by the **deadline** date.
Basic Derwent Week: 200412

21/3,K/5 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0013367411 - Drawing available
WPI ACC NO: 2003-456845/ **200343**
XRPX Acc No: N2003-363340
Resource management method for real-time data processing system, involves providing lower priority to fixed priority activities than reservation activities
Patent Assignee: TIMESYS CORP (TIME-N)
Inventor: RAJKUMAR R
Patent Family (1 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20030061260	A1	20030327	US 2001962925	A	20010925	200343	B

Priority Applications (no., kind, date): US 2001962925 A 20010925

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20030061260	A1	EN	15	6	

Original Publication Data by Authority

Original Abstracts:
...are scheduled to run concurrently. A first subset of tasks are defined as reservation activities, **each** having specified **parameters** for determining **priority** among other **reservation** **activities** . Specified reservation **activity** **parameters** may include a resource consumption amount, execution time period, **deadline** , start time and/ or reservation lifetime. The system also supports resource allocation among fixed-priority activities, such as may...
Claims:
...allocating resource accesses on a reservation activity basis, each such reservation having specified parameters for **determining** **a** **priority** allocation among other reservation **activities** ;allocating other resource

accesses as fixed priority activities , the fixed priority activities each having a priority value with respect to other fixed priority activities; andwherein the...
Basic Derwent Week: 200343

21/3,K/6 (Item 5 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0013204369 - Drawing available
WPI ACC NO: 2003-288622/ 200328
XRPX Acc No: N2003-229453
Job request disclosure method in advertising industry, involves comparing responses to job request received from service provider with responses to be received, so as to disclose request to service provider outside group
Patent Assignee: DEPINTO R (DEPI-I); DICKSON C L (DICK-I)
Inventor: DEPINTO R; DICKSON C L; DE PINTO R
Patent Family (2 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20020194112	A1	20021219	US 2000249286	P	20001117	200328	B
			US 2001987690	A	20011115		
US 7080117	B2	20060718	US 2001987690	A	20011115	200648	E

Priority Applications (no., kind, date): US 2000249286 P 20001117; US 2001987690 A 20011115

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20020194112	A1	EN	73	34	Related to Provisional US 2000249286

Original Publication Data by Authority

Original Abstracts:
...passes, lower rated members are shown the job until the quota of responses or the deadline is reached.

...

...passes, lower rated members are shown the job until the quota of responses or the deadline is reached.
Claims:
...request comprising a quota that indicates the number of responses to be received and a deadline for receipt of the responses, the method comprising:determining a reputation rating for each of a plurality of service providers;disclosing the job request to a group of service providers, wherein the reputation rating of each of the...

...the job request from at least one service provider within the group;prior to the deadline , comparing a number of responses received with the quota;if the number of responses received is lower than the quota, disclosing the job request to service providers...
...request comprising a quota that indicates the number of responses to be received and a deadline for receipt of the responses, the method comprising: determining a reputation rating for each of a plurality of service providers; disclosing the job request to a group of service providers, wherein the reputation rating of each of the service providers ...

...the job request from at least one service provider within the group;prior to the deadline , comparing a number of responses received with the quota;if the number of responses received is lower than the quota, disclosing the job request to service providers outside the group, wherein the disclosing is carried out in order of decreasing reputation rating.
Basic Derwent Week: 200328

21/3,K/7 (Item 6 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0013155875 - Drawing available
WPI ACC NO: 2003-238572/ **200323**
XRPX Acc No: N2003-190108
Workflow process management method for workflow resources, involves executing activities of work node in accordance with selected priority level to meet expected deadline of process
Patent Assignee: CHEENIYIL L K (CHEE-I); HEWLETT-PACKARD DEV CO LP (HEWP) ; KRISHNASWAMY S (KRIS-I)
Inventor: CHEENIYIL L K; KRISHNASWAMY S
Patent Family (2 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20020184293	A1	20021205	US 2001839003	A	20010420	200323	B
US 6990664	B2	20060124	US 2001839003	A	20010420	200607	E

Priority Applications (no., kind, date): US 2001839003 A 20010420

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20020184293	A1	EN	6	3	

...involves executing activities of work node in accordance with selected priority level to meet expected deadline of process
...work node, is selected by comparing corresponding ETC value with remaining time available for process **deadline** . Activities associated with work nodes, are executed in accordance with selected priority level to meet the expected **deadline** .

Original Publication Data by Authority

Original Abstracts:
...workflow process to bring execution time for said process at least closer to an expected **deadline** . The process includes **a** plurality of work nodes and a set of priority levels associated with each work node...

...corresponding ETC value less than or equal to a remaining time available to meet said **deadline** ; and executing activities **associated** with said work nodes in accordance with said selected priority levels to substantially meet said expected **deadline** .

...
...workflow process to bring execution time for said process at least closer to an expected **deadline** . The process includes a plurality of work nodes **and** a set of priority levels associated with each work node. The method includes the steps...

...corresponding ETC value less than or equal to a remaining time available to meet said **deadline** ; and executing activities associated with said work nodes **in** accordance with said selected priority levels to substantially meet said expected **deadline.** >
Claims:
...workflow process to bring execution time for said process at least closer to an expected **deadline** , said process including **a** plurality of work nodes and a set of priority levels associated with each work node...

...corresponding ETC value less than or equal to a remaining time available to meet said **deadline** ; andexecuting activities associated with said work **nodes** in accordance with said selected priority levels to substantially meet said expected **deadline** .

...

...workflow process to bring execution time for said process at least closer to an expected **deadline** , said process including a plurality of work nodes and a set of priority levels associated with each work node, said **method** including the steps of:generating for each work node a set of expected time to...

...time to complete the process including the time taken by the corresponding node to complete **its** **activity** for a selected **priority** level, wherein said ETC values are generated using **formula** ETC=eta+2sigma and wherein eta is a statistical **mean** and a is **a** statistical standard

deviation of values collected during a learning phase;selecting for each work node a priority level that has a corresponding ETC value less than or equal to a remaining time available to meet said expected deadline ; andexecuting activities associated with said work nodes in accordance with said selected priority levels, thereby brining execution time for said process at least closer to said expected deadline.> Basic Derwent Week: 200323

21/3,K/8 (Item 7 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0013117679 - Drawing available
WPI ACC NO: 2003-199375/ 200319
XRPX Acc No: N2003-158582
Computer based acquisition integration project plan generation method involves displaying and storing information regarding user selected integration event in corresponding integration area as project plan
Patent Assignee: CHEYNS J (CHEY-I); CRABTREE C (CRAB-I); GEN ELECTRIC CAPITAL CORP (GENE); GENERAL ELECTRIC CO (GENE); HERMAN R (HERM-I); LINEBERRY S S (LINE-I)
Inventor: CHEYNS J; CRABTREE C; HERMAN R; LINEBERRY S S
Patent Family (6 patents, 93 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20020169649	A1	20021114	US 2001855091	A	20010514	200319	B
WO 2002093309	A2	20021121	WO 2002US15365	A	20020513	200319	E
GB 2392534	A	20040303	WO 2002US15365	A	20020513	200417	E
			GB 200328634	A	20031210		
AU 2002259218	A1	20021125	AU 2002259218	A	20020513	200452	E
JP 2004535629	W	20041125	JP 2002589922	A	20020513	200477	E
			WO 2002US15365	A	20020513		
US 7006978	B2	20060228	US 2001855091	A	20010514	200616	E

Priority Applications (no., kind, date): US 2001855091 A 20010514

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20020169649	A1	EN	93	81	
WO 2002093309	A2	EN			

National Designated States,Original: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
Regional Designated States,Original: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW

Number	Kind	Lan	Pg	Dwg	Filing Notes
GB 2392534	A	EN			PCT Application WO 2002US15365
					Based on OPI patent WO 2002093309
AU 2002259218	A1	EN			Based on OPI patent WO 2002093309
JP 2004535629	W	JA	161		PCT Application WO 2002US15365
					Based on OPI patent WO 2002093309

...an event is selected by the user. The information such as name of a person, due date , completion percentage and comments regarding each user selected event are displayed and stored into corresponding...

Original Publication Data by Authority

Original Abstracts:
...selected integration area, displaying at least one of a name of a person responsible, a due date , a completion percentage , and a commentary for each user selected, pre-defined integration event, and storing the user selected...

...selected integration area, displaying at least one of a name of a person responsible, a due date , a completion percentage, and a commentary for each user selected, pre-defined integration event, and storing the user selected, pre-defined integration events and...

...selected integration area, displaying at least one of a name of a person

responsible, a **due** **date** , a completion percentage, and a commentary for each user selected, pre-defined **integration** **event** , and storing the user selected, pre-defined integration events and corresponding integration areas as an...
Claims:
...selected integration area;displaying at least one of a name of a person responsible, a **due** **date** , a completion percentage, and a commentary for each user selected, pre-defined integration event; and **storing** **the** user selected, pre-defined integration events and at least one of the name of a person responsible, the **due** **date** , the completion percentage, and the commentary for each user selected, pre-defined integration event into corresponding integration **areas** , **as** an acquisition integration project plan...

...to operations phase of the acquisition process;displaying a name of a person responsible, a **due** **date** , a completion percentage, and a commentary for **each** user selected, pre- **defined** integration **event** and each automatically selected, pre- **defined** integration event; andstoring the user selected and the automatically selected integration events and the name of a **person** **responsible** , the **due** date , the completion percentage, and the commentary for each integration event into corresponding integration areas, asBasic Derwent Week: 200319

21/3,K/9 **(Item 8 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

0012381192 - Drawing available
WPI ACC NO: 2002-324615/ **200236**
XRPX Acc No: N2002-254921
Task controller e.g. for scheduling/execution control of real-time task **,** determines priority **of execution of** task **in memory, next to execution of pre-** deadline **errored task based on** deadline **error generation frequency**
Patent Assignee: RICOH KK (RICO)
Inventor: SUGA S
Patent Family (1 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
JP 2002073354	A	20020312	JP 2000258439	A	20000829	200236	B

Priority Applications (no., kind, date): JP 2000258439 A 20000829

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
JP 2002073354	A	JA	14	9	

Task controller e.g. for scheduling/execution control of real-time task **,** determines priority **of execution of** task **in memory, next to execution of pre-** deadline **errored task based on** deadline **error generation frequency**

Alerting Abstract ...NOVELTY - A **task** scheduler (10) **determines** the **priority** of execution of **task** stored in a task control information memory (8), next to execution of pre- **deadline** errored task based on **deadline** error generation frequency....ADVANTAGE - Improves stability of real-time system by reducing the **deadline** error generation frequency...

...
...

21/3,K/10 **(Item 9 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

0010999897 - Drawing available
WPI ACC NO: 2001-625036/ **200172**
XRPX Acc No: N2001-465796
Task priority **decision apparatus for workflow system, has process** deadline **determining unit for determining process** deadline **for specific task**

information
Patent Assignee: FUJITSU LTD (FUIT)
Inventor: KOBAYASHI Y
Patent Family (3 patents, 2 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 20010027463	A1	20011004	US 2001794429	A	20010227	200172	B
JP 2001338107	A	20011207	JP 200169742	A	20010313	200202	E
JP 2001338108	A	20011207	JP 200169743	A	20010313	200202	E

Priority Applications (no., kind, date): JP 200084741 A 20000322; JP 200084674 A 20000322

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 20010027463	A1	EN	32	18	
JP 2001338107	A	JA	10		
JP 2001338108	A	JA	12		

Task priority decision apparatus for workflow system, has process deadline determining unit for determining process deadline for specific task information

Alerting Abstract ...NOVELTY - A retrieving unit (1d) extracts process **deadline** determining information from a document information acquired by a document information acquisition unit (1c). A process **deadline** determining unit (1g) determines a process **deadline** for a piece of task information on the basis of the extracted process **deadline** determining information....1g Process **deadline** determining unit

Original Publication Data by Authority

Original Abstracts:
...processing system that performs a work process by sending and receiving task information. The apparatus **is** capable of automatically **determining** process **priority of a piece of** information concerning a **task** . A **task** information extracting unit extracts a piece of task information. A related document information acquiring unit acquires document information related to the piece of task information. A process **deadline** determining information retrieving **unit** extracts process **deadline** determining information from **the** document information. A process **deadline** determining unit determines **a** process **deadline** for the piece **of** task information on the basis of the process **deadline** determining information.

Claims:
...related to said piece of task information extracted by said task information extracting means; process **deadline** determining information retrieving means for extracting process **deadline** determining information from said document information **acquired** by said related document information acquisition means; **and** process **deadline** determining means for determining a process **deadline** for said piece of task information on the basis **of** the process **deadline** determining information extracted **by** said process **deadline** determining means.

21/3,K/11 (Item 10 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0010697659 - Drawing available
WPI ACC NO: 2001-307778/ **200132**
XRPX Acc No: N2001-220269
Real time periodic and aperiodic task scheduling and message passing adapted to analyze timing behavior within a multiple-task system utilizing undelayed and single sample delayed message connections
Patent Assignee: HONEYWELL INC (HONE)
Inventor: BINNS P A; VESTAL S C
Patent Family (9 patents, 81 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
WO 2000070455	A2	20001123	WO 2000US13356	A	20000515	200132	B

AU 200048517	A	20001205	AU 200048517	A	20000515	200132	E
KR 2002022049	A	20020323	KR 2001714519	A	20011114	200264	E
EP 1244963	A2	20021002	EP 2000930754	A	20000515	200265	E
			WO 2000US13356	A	20000515		
JP 2002544621	W	20021224	JP 2000618831	A	20000515	200313	E
			WO 2000US13356	A	20000515		
US 6567840	B1	20030520	US 1999312592	A	19990514	200336	E
EP 1244963	B1	20031105	EP 2000930754	A	20000515	200377	E
			WO 2000US13356	A	20000515		
DE 60006422	E	20031211	DE 60006422	A	20000515	200405	E
			EP 2000930754	A	20000515		
			WO 2000US13356	A	20000515		
AU 769245	B	20040122	AU 200048517	A	20000515	200412	E

Priority Applications (no., kind, date): US 1999312592 A 19990514

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
WO 2000070455	A2	EN	52	14	

National Designated States,Original: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH GM HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW

Regional Designated States,Original: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW

Number	Kind	Lan	Pg	Dwg	Filing Notes
AU 200048517	A	EN			Based on OPI patent WO 2000070455
EP 1244963	A2	EN			PCT Application WO 2000US13356 Based on OPI patent WO 2000070455

Regional Designated States,Original: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

Number	Kind	Lan	Pg	Dwg	Filing Notes
JP 2002544621	W	JA	60		PCT Application WO 2000US13356 Based on OPI patent WO 2000070455
EP 1244963	B1	EN			PCT Application WO 2000US13356 Based on OPI patent WO 2000070455

Regional Designated States,Original: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

Number	Kind	Lan	Pg	Dwg	Filing Notes
DE 60006422	E	DE			Application EP 2000930754 PCT Application WO 2000US13356 Based on OPI patent EP 1244963 Based on OPI patent WO 2000070455
AU 769245	B	EN			Previously issued patent AU 200048517 Based on OPI patent WO 2000070455

Original Publication Data by Authority

Original Abstracts:

...among software task objects and hardware objects. Task priorities are assigned inversely with period or **deadline** , so that tasks **with** shorter periods or deadlines have higher scheduling priorities. Periods of high-criticality tasks are decomposed into smaller pieces that are sequentially dispatched at higher rates where the initial **assignment** of **priority** is inconsistent with **task** criticality. The methods provide for **deterministic** communication among periodic **processes** .

...

...among software task objects and hardware objects. Task priorities are assigned inversely with period or **deadline** , so that tasks with shorter periods or deadlines **have** higher scheduling priorities. Periods of high-criticality tasks are decomposed into smaller pieces that are sequentially dispatched at higher rates where the initial assignment of **priority** is inconsistent **with** **task** criticality. The methods provide for **deterministic** communication among **periodic** processes.

...

...among software task objects and hardware objects. Task priorities are assigned inversely with period or **deadline** , so that tasks with shorter periods or deadlines have higher scheduling priorities. Periods of high-criticality tasks are decomposed into smaller pieces that are

sequentially dispatched at higher rates where the initial assignment of priority is inconsistent with task criticality. The methods provide for deterministic communication among periodic processes .

Claims:
...assigned scheduling priority of a plurality of tasks (110) in a multitask system (100), comprising: defining a first list of the plurality of tasks , wherein the first list of the plurality of tasks is sorted with a task deadline as a primary key and a task criticality as a secondary key;transforming the task deadline of each of the plurality of tasks one at a time using a transformation scenario, beginning with the task having the least task deadline , thereby producing a transformed task deadline for each of the plurality of tasks;defining a second list of the plurality of tasks, wherein the second list of the plurality of tasks is sorted with the transformed task deadline as the primary key, further wherein each transformed task deadline of a task having a first task criticality is less than any transformed task deadline of a task having a task criticality less than the first task criticality; andassigning scheduling priority in an order of the second list of the plurality of tasks, thereby producing the assigned scheduling priority...

...What is claimed is:1. A method of generating an assigned scheduling priority of a plurality of tasks in a multitask system, comprising: defining a first list of the plurality of tasks, wherein the first list of the plurality of tasks is sorted with a task deadline as a primary key and a task criticality as a secondary key;transforming the task deadline of each of the plurality of tasks one at a time using a transformation scenario, beginning with the task having the least task deadline , thereby producing a transformed task deadline for each of the plurality of tasks ; defining a second list of the plurality of tasks, wherein the second list of the plurality of tasks is sorted with the transformed task deadline as the primary key, further wherein each transformed task deadline of a task having a first task criticality is less than any transformed task deadline of a task having a task criticality less than the first task criticality; andassigning scheduling priority in an order of the second list of the plurality of tasks, thereby producing the assigned scheduling priority. Basic Derwent Week: 200132

21/3,K/12 (Item 11 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0010352902 - Drawing available
WPI ACC NO: 2000-668506/ 200065
XRPX Acc No: N2000-495533
Task scheduling procedure for information processor, involves setting execution order of tasks , so that they are executed within preset deadline
Patent Assignee: NEC IC MICROCOMPUTER SYSTEMS LTD (NIDE)
Inventor: FUJIWARA Y
Patent Family (1 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
JP 2000276360	A	20001006	JP 199983643	A	19990326	200065	B

Priority Applications (no., kind, date): JP 199983643 A 19990326

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
JP 2000276360	A	JA	15	9	

Task scheduling procedure for information processor, involves setting execution order of tasks , so that they are executed within preset deadline

Alerting Abstract ...to continuously execute a task (303) following execution of task (301). When tasks exceeding a deadline is detected, due to replacement of execution order of the task (303), exchange of execution ...
...DESCRIPTION OF DRAWINGS - The figure shows the time chart performed in

the order of deadline .

...
...

21/3,K/13 (Item 12 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0010268232 - Drawing available
WPI ACC NO: 2000-580980/ 200055
XRPX Acc No: N2000-430065
Data transfer request processing scheme for reducing the mechanical actions in a data storage system by classifying requests according to completion deadlines
Patent Assignee: TOSHIBA KK (TOKE)
Inventor: KANAI T; YAO H; KANAI T T C; YAO H T C
Patent Family (11 patents, 28 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
EP 1039366	A2	20000927	EP 2000302445	A	20000324	200055	B
JP 2000276303	A	20001006	JP 199983628	A	19990326	200056	E
CA 2302996	A1	20000926	CA 2302996	A	20000323	200058	E
JP 3382176	B2	20030304	JP 199983628	A	19990326	200324	E
US 6802064	B1	20041005	US 2000534055	A	20000324	200465	E
US 20050027936	A1	20050203	US 2000534055	A	20000324	200511	E
			US 2004930870	A	20040901		
EP 1039366	B1	20051026	EP 2000302445	A	20000324	200571	E
DE 60023383	E	20051201	DE 60023383	A	20000324	200580	E
			EP 2000302445	A	20000324		
DE 60023383	T2	20060524	DE 60023383	A	20000324	200635	E
			EP 2000302445	A	20000324		
CA 2302996	C	20060808	CA 2302996	A	20000323	200654	E
US 7127714	B2	20061024	US 2000534055	A	20000324	200670	E
			US 2004930870	A	20040901		

Priority Applications (no., kind, date): JP 199983628 A 19990326; EP 2000302445 A 20000324

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
EP 1039366	A2	EN	30	14	
Regional Designated States,Original: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI					
JP 2000276303	A	JA	23		
CA 2302996	A1	EN			
JP 3382176	B2	JA	23		Previously issued patent JP 2000276303
US 20050027936	A1	EN			Continuation of application US 2000534055
					Continuation of patent US 6802064
EP 1039366	B1	EN			
Regional Designated States,Original: DE FR GB					
DE 60023383	E	DE			Application EP 2000302445
					Based on OPI patent EP 1039366
DE 60023383	T2	DE			Application EP 2000302445
					Based on OPI patent EP 1039366
CA 2302996	C	EN			
US 7127714	B2	EN			Continuation of application US 2000534055
					Continuation of patent US 6802064

...NOVELTY - Requests (105) are received (101) and class switching time is set (102) earlier than deadline of request. Scheduler (103) compares current time and class switching time and classifies request. Storage...

Original Publication Data by Authority

Original Abstracts:

...in which a completion of data transfer requested by a data transfer request within a **deadline** for completing the requested data transfer, specified for the request, is a primary key factor in determining an **order** of processing, and a second class in which a reduction of amounts of mechanical **actions** of **a** storage **device** required in carrying out the data transfer requested by the request is a primary **key** factor in **determining** the **order** of processing. Data transfer requests with respect to the storage device are sequentially accepted. Each...

...current time has not yet exceeded a time earlier by a certain time than the **deadline** . Each data transfer request is classified into the first class after the current time has already exceeded the **time.** >

Claims:

...requests with respective deadlines for completing requested data transfers; li>regularly checking a relation between a **deadline** of each accepted data transfer request and a current time and classifying each accepted data transfer request into one of first and second classes according to the proximity of **the** current time to each **deadline** ; wherein accepted data transfer requests with close deadlines are classified into the first class; scheduling processing of first class data transfer requests that are classified as the first class **by** the classifying step according to a first scheduling policy in which a completion of data...

...second class by the classifying step according to a second scheduling policy in which a **reduction** of **amounts** of the mechanical **actions** required in carrying out data transfers requested by the data transfer requests is a primary ke...transfer requests with respective deadlines for completing requested data transfers;setting a time earlier than **a** deadline of each accepted data transfer request as a corresponding class switching time for each...class switching time and each accepted data transfer request into a second class when the **current** time has not yet exceeded the corresponding class switching time;scheduling processing of first class...

...accepting the data transfer requests;setting, if each accepted data transfer request is accompanied with **a** deadline for completing a requested data transfer, a time earlier than **the** deadline as a corresponding class switching time for the accompanied data transfer request;repeatedly checking...
...the current time has not yet exceeded the corresponding class switching time;scheduling processing of **first** class data transfer requests that are classified as the first class **by** the classifying step according to a first scheduling policy in which a completion of data...
Basic Derwent Week: **200055**

21/3,K/14 (Item 13 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0009039153 - Drawing available
WPI ACC NO: 1998-597045/ **199851**
XRPX Acc No: N1998-464652
Control system for executing tasks within transactions - reduces longest dead-line by increment to give new dead-line if initial maximum end-to-end delay exceeds desired maximum end-to-end delay
Patent Assignee: ROLLS-ROYCE PLC (RORO)
Inventor: BATE I; BURNS A
Patent Family (2 patents, 26 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
EP 880094	A2	19981125	EP 1998303886	A	19980518	199851	B
US 6151538	A	20001121	US 199881065	A	19980519	200101	E

Priority Applications (no., kind, date): GB 199710522 A 19970523

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
EP 880094	A2	EN	7	6	

Regional Designated States,Original: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
Alerting Abstract ...The control system operates in a way that each task

is assigned an initial deadline . An initial maximum end-to-end delay of the transaction is calculated using the initial deadlines D and the given order of the tasks . If the initial maximum end-to-end delay exceeds the desired maximum end-to-end delay then the deadline of the task with the longest deadline is reduced by an increment to give a new deadline .
...

...For each task, if the task following has an equivalent deadline , its deadline is reduced by an increment to give a new deadline . A new end-to-end delay is calculated using the new deadlines and the given order of the tasks . The alterations are repeated until the new end-to-end delay does not exceed the

Original Publication Data by Authority

Original Abstracts:

A hybrid control system executes tasks within a transaction which is executed in a given order . The order in which the tasks are executed is inversely proportional to their deadlines. The deadlines are assigned an initial deadline D, an initial maximum end-to-end delay of the transaction is calculated using the initial deadlines D and the given order of the tasks . The deadline of the task with the largest deadline is reduced by an increment to give a new deadline and if the task following it has an increment to give a new deadline . A new end-to- end delay is calculated using the new deadlines and the given order of the tasks . These steps are repeated until the new end-to-end delay does not exceed the desired maximum end-to-end...

...A hybrid control system executes tasks within a transaction which is executed in a given order . The order in which the tasks are executed is inversely proportional to their deadlines. The deadlines are assigned an initial deadline D, an initial maximum end- to -end delay of the transaction is calculated using the initial deadlines D and the given order of the tasks . The deadline of the task with the largest deadline is reduced by an increment to give a new deadline and if the task following it has an increment to give a new deadline . A new end-to-end delay is calculated using the new deadlines and the given order of the tasks . These steps are repeated until the new end-to-end delay does not exceed the desired maximum end-to-end delay.

Claims:

...system for executing tasks within a transaction, wherein: the tasks within the transaction must be executed in a given order and within given deadlines; the order in which the tasks are executed once they are released is inversely proportional to their deadlines; the transaction must be executed within a...

...system have been assigned in the following way: i) each task is assigned an initial deadline D; ii) an initial maximum end- to -end delay of the transaction is calculated using the initial deadlines D and the given order of the tasks ; iii) if the initial maximum end-to- end delay exceeds the desired maximum end-to-end delay; a) the deadline of the task with the longest deadline is reduced by an increment to give a new deadline ; b) for each task, if the task following has an equivalent deadline , its deadline is reduced by an increment to give a new deadline ; c) a new end-to-end delay is calculated using the new deadlines and the given order of the tasks ; and d) steps a) to c) are repeated until the new end -to-end delay does not exceed the desired maximum end-to-end delay...

...within a transaction, wherein: the tasks within the transaction must be executed in a given order and within given deadlines ; the order in which the tasks are executed once they are released is inversely proportional to their deadlines; the transaction must be executed within a desired maximum end-to-end delay; and the deadlines used by the control system have been assigned in the following way: i) each task is assigned an initial deadline D; ii) an initial maximum end-to-end delay of the transaction is calculated using the initial deadlines D and the given order of the tasks ; iii) if the initial maximum end-to-end delay exceeds the desired maximum end-to-end delay ; a) the deadline of the task with the longest deadline is reduced by an increment to give a new deadline ; b) for each task, if the task following has an

equivalent deadline , its deadline is reduced by an increment to give a new deadline ; c) a new end-to-end delay is calculated using the new deadlines and the given order of the tasks ; and d) steps a) to c) are repeated until the new end-to-end delay does not exceed the desired maximum end-to-end delay. ...
...

21/3,K/15 (Item 14 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0009001333 - Drawing available
WPI ACC NO: 1998-556775/ 199847
XRPX Acc No: N1998-434030
Automated computer based management method for semiconductor manufacturing fabrication plant - involves calculating required turn rate for each lot by calculating critical ratio for each lot based on which lots are sorted
Patent Assignee: TAIWAN SEMICONDUCTOR MFG CO LTD (TASE-N)
Inventor: CHIN W; HUANG S; LIN K; WANG J
Patent Family (1 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
US 5818716	A	19981006	US 1996735059	A	19961018	199847	B

Priority Applications (no., kind, date): US 1996735059 A 19961018

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 5818716	A	EN	16	7	

Alerting Abstract ...a current work-in-progress WIP list are input to a CPU (12). Each lot due date is modified by calculating the remaining process time of an LDD for each lot. Then...

Original Publication Data by Authority

Original Abstracts:
...cycle time and precise delivery to satisfy customer expectations is a major task. A dispatching algorithm named "Required Turn Rate (RTR)" functions according to the level of current wafers in process (WIP) algorithm revising the due date for every lot to satisfy the demand from Master Production Scheduling (MPS). Further the RTR algorithm calculates the RTR...

...based on process flow to fulfill the delivery requirement. The RTR algorithm determines not only due date and production priority of each lot, but also provides RTR for local dispatching. The local dispatching systems of each...
Basic Derwent Week: 199847

21/3,K/16 (Item 15 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0007561857 - Drawing available
WPI ACC NO: 1996-176986/ 199618
XRPX Acc No: N1996-148682
Data processor task scheduling method for computer - by giving execution approval to highly prioritised task immediately before task being presently performed ends, if end anticipation time of concerned task ends earlier than what was previously assumed
Patent Assignee: HITACHI LTD (HITA)
Inventor: ASAI M; SAITO A; SATOU M; SHIBATA K; TAKIYASU Y
Patent Family (1 patents, 1 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	
JP 8055036	A	19960227	JP 1994210632	A	19940811	199618	B

Priority Applications (no., kind, date): JP 1994210632 A 19940811

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Patent Details
Number          Kind  Lan    Pg  Dwg  Filing Notes
JP 8055036        A   JA     15   10

  Alerting Abstract ...The method involves  determining  the execution
order  of a  task  according to a task execution permission demand that was
received through a scheduler (102). Once the demand from each task has been
arranged in order based on a task end  deadline , a corresponding task
table (106) is produced...


      ...
Basic Derwent Week:  199618 ...
? show files;ds
File 347:JAPIO Dec 1976-2007/Jun(Updated 070926)
         (c) 2007 JPO & JAPIO
File 350:Derwent WPIX 1963-2007/UD=200761
         (c) 2007 The Thomson Corporation

Set     Items   Description
S1    1210449   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2      33678   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
             WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       1378   DEADLINE OR DUE()DATE
S4         15   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        690   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      80173   S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     788372   DIVID??? OR DIVISION OR MOD
S8       2310   TMAX OR T()MAX
S9          4   ULTIMATE(2W)S3 OR ULTIMATELY()DUE
S10         1   S2 AND (S4 OR S9)
S11         1   PN=US 20050022187
S12         1   S2 AND S11
S13         0   (S4 OR S9) AND S11
S14         1   S3 AND S11
S15      4059   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S16        20   (S5 OR S15) AND S3
S17         0   S16 AND S7:S8
S18        20   S10 OR S16
S19        13   S18 AND PY=1963:2003
S20        12   S18 AND AY=1963:2003 AND AC=US
S21        16   S19:S20
? b 348,349
       01oct07 13:58:05 User263760 Session D4960.2
           $18.72    1.710 DialUnits File347
               $1.10  1 Type(s) in Format  3
            $1.10  1 Types
    $19.82  Estimated cost File347
          $191.66   11.553 DialUnits File350
              $38.16  18 Type(s) in Format  3
               $0.00  1 Type(s) in Format 56 (UDF)
           $38.16  19 Types
   $229.82  Estimated cost File350
            OneSearch, 2 files, 13.262 DialUnits FileOS
     $3.73  TELNET
   $253.37  Estimated cost this search
   $253.39  Estimated total session cost  13.527 DialUnits


SYSTEM:OS  - DIALOG OneSearch
  File 348:EUROPEAN PATENTS 1978-2007/ 200738
         (c) 2007 European Patent Office
*File 348: For important information about IPCR/8 and forthcoming
changes to the IC= index, see HELP NEWSIPCR.
  File 349:PCT FULLTEXT 1979-2007/UB=20070927UT=20070920
```

```
        (c) 2007 WIPO/Thomson
*File 349: For important information about IPCR/8 and forthcoming
changes to the IC= index, see HELP NEWSIPCR.

      Set  Items  Description
      ---  -----  -----------
? edit ken
Name:     KEN
Modified: 01oct07
Editor entered
Name:           KEN
Total lines:        9
Line increment:    10
Last line:         90
EDIT:
? l
  10. S TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVITIES OR
      ACTION? ? OR EVENT? ?
  20. S S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
      WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RATING OR
      SORT??? OR ORDER???)
  30. S DEADLINE OR DUE()DATE
  40. S (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR EFFECTIVE
      OR FIRM OR DEFINITIVE)(2W)S3
  50. S S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
  60. S S1(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE OR
      COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? OR DERIV???)

  70. S DIVID??? OR DIVISION OR MOD
  80. S TMAX OR T()MAX
  90. SET KWIC 30
EDIT:
? d 60
EDIT:
? i 60
INPUT:    60
? s s2(5n)(determin?????? or calculat???? or find??? or compute or computes or
computed or computing or measur? or defin??? or deriv???)
INPUT:    61
?
Returning to EDIT mode
EDIT:
? l
  10. S TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVITIES OR
      ACTION? ? OR EVENT? ?
  20. S S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
      WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RATING OR
      SORT??? OR ORDER???)
  30. S DEADLINE OR DUE()DATE
  40. S (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR EFFECTIVE
      OR FIRM OR DEFINITIVE)(2W)S3
  50. S S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
  60. S S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE OR
      COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? OR DERIV???)

  70. S DIVID??? OR DIVISION OR MOD
  80. S TMAX OR T()MAX
  90. SET KWIC 30
EDIT:
? save
-->Replace "KEN"?  (Y=Yes  N=No)
? y
Temp SearchSave "KEN" stored
Exit from editor
? exs ken
          139516  TASK? ?
           72296  TRANSACTION? ?
           31089  JOB? ?
          357825  ACTIVITY
          138543  ACTIVITIES
          548412  ACTION? ?
          558104  EVENT? ?
```

```
      S1 1138982  TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR
                  ACTIVITIES OR ACTION? ? OR EVENT? ?
Processing
         1138982  S1
          460754  PRIORITY
           12219  PRIORITIES
          145272  IMPORTANCE
          653320  IMPORTANT
          777265  WEIGH???
           87542  SCOR???
          149688  GRADE? ?
            9282  GRADING
          771033  RATE? ?
           38236  RATING
          583929  SORT???
         1356429  ORDER???
      S2  111034  S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT
                  OR WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ?
                  OR RATING OR SORT??? OR ORDER???)
            2101  DEADLINE
          989024  DUE
         2329538  DATE
            1217  DUE(W)DATE
      S3    3176  DEADLINE OR DUE()DATE
           91497  MAX
          607083  MAXIMUM
          160634  ABSOLUTE
          506170  FINAL
           29207  FINALE
          412987  LAST
          695690  EFFECTIVE
           34046  FIRM
           19301  DEFINITIVE
            3176  S3
      S4      50  (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR
                  EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
          111034  S2
          416473  FORMULA??
          176877  ALGORITHM? ?
          643780  PROCEDURE? ?
      S5    4538  S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
Processing
>>>File 349 processing for MEASUR? stopped at MEASURERRWFT
Processing
          111034  S2
         1234443  DETERMIN??????
          527730  CALCULAT????
          437232  FIND???
           44240  COMPUTE
           29657  COMPUTES
           78979  COMPUTED
          103249  COMPUTING
          849385  MEASUR?
         1289290  DEFIN???
          586315  DERIV???
      S6   13203  S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR
                  COMPUTE OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR?
                  OR DEFIN??? OR DERIV???)
          505776  DIVID???
          185648  DIVISION
           33291  MOD
      S7  615654  DIVID??? OR DIVISION OR MOD
            6283  TMAX
          968528  T
           91497  MAX
            1349  T(W)MAX
      S8    7322  TMAX OR T()MAX
KWIC is set to 30.
? s s2(5n)measur???
          111034  S2
          829625  MEASUR???
      S9    2916  S2(5N)MEASUR???
```

```
?
? ds

Set     Items   Description
S1    1138982   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
                IES OR ACTION? ? OR EVENT? ?
S2     111034   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
                 WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
                ING OR SORT??? OR ORDER???)
S3       3176   DEADLINE OR DUE()DATE
S4         50   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
                EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5       4538   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      13203   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
                 OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
                OR DERIV???)
S7     615654   DIVID??? OR DIVISION OR MOD
S8       7322   TMAX OR T()MAX
S9       2916   S2(5N)MEASUR???
? s s4(100n)(s5:s6 or s9)
              50  S4
           16419  S5:S6
            2916  S9
     S10       3  S4(100N)(S5:S6 OR S9)
? ds

Set     Items   Description
S1    1138982   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
                IES OR ACTION? ? OR EVENT? ?
S2     111034   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
                 WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
                ING OR SORT??? OR ORDER???)
S3       3176   DEADLINE OR DUE()DATE
S4         50   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
                EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5       4538   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      13203   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
                 OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
                OR DERIV???)
S7     615654   DIVID??? OR DIVISION OR MOD
S8       7322   TMAX OR T()MAX
S9       2916   S2(5N)MEASUR???
S10         3   S4(100N)(S5:S6 OR S9)
? s (s5:s6 or s9)(50n)s3
           16419  S5:S6
            2916  S9
            3176  S3
     S11      45  (S5:S6 OR S9)(50N)S3
? s (s5:s6 or s9)(50n)s3(50n)s8
           16419  S5:S6
            2916  S9
            3176  S3
            7322  S8
     S12       1  (S5:S6 OR S9)(50N)S3(50N)S8
? t/3,k/1

 12/3,K/1     (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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01881235
Improved EDF scheduling method
Ablauf-planungs-verfahren
Methode de planification
PATENT ASSIGNEE:
  LG ELECTRONICS INC., (1914270), 20, Yoido-Dong,Youngdungpo-gu, Seoul,
    (KR), (Applicant designated States: all)
INVENTOR:
  Park, Moon-Ju, 582-10, Changsin-dongJongno-Gu, Seoul, (KR)
LEGAL REPRESENTATIVE:
  Katerle, Axel et al (9219091), Wuesthoff & Wuesthoff Patent- und
    Rechtsanwalte Schweigerstrasse 2, 81541 Munchen, (DE)
```

PATENT (CC, No, Kind, Date): EP 1522924 A2 050413 (Basic)
EP 1522924 A3 070509
APPLICATION (CC, No, Date): EP 2003021619 030925;
PRIORITY (CC, No, Date): KR 203050708 030723
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR; HU; IE; IT; LI; LU; MC; NL; PT; RO; SE; SI; SK; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK
INTERNATIONAL PATENT CLASS (V7): G06F-009/48
INTERNATIONAL CLASSIFICATION (V8 + ATTRIBUTES):
IPC + Level Value Position Status Version Action Source Office:
G06F-0009/48 A I F B 20060101 20050209 H EP
ABSTRACT WORD COUNT: 86
NOTE:
Figure number on first page: 3

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200515	476
SPEC A	(English)	200515	2265
Total word count - document A			2742
Total word count - document B			0
Total word count - documents A + B			2742

...SPECIFICATION tasks; updating current time as the lowest priority; and processing the tasks in a shortest- **deadline** -first order from the updated lowest priority on a temporal axis.
In the present invention...

...a priority level. If the number of the tasks is less than that of the **priority** level, a **priority** of each **task** is **determined** as a value obtained by dividing a value obtained by dividing a **deadline** di)) of a corresponding task by a maximum **deadline** Tmax)) by a specific time unit q. The maximum **deadline** is a relative **deadline** of a task having the longest period among the tasks, and the specific time unit is a value obtained by dividing the maximum **deadline** by the number of a priority level.
The current time is indicated by a current time indicator obtained by dividing a value obtained by dividing current time by the maximum **deadline** by the specific time unit.
In the EDF scheduling method according to another aspect of...

...tasks are grouped into several sets and one current time indicator is set to each **task** set.
A **priority** level (Pi))) of a **task** having a **deadline** which is in a range of 2m-1)Tmin)) (equivalent to) 2m)Tmin)) is obtained by a **formula** of wherein the q(m) denotes a time unit relevant to the mth) time indicator...

...of a priority level relevant to each current time indicator, and the di)) denotes a **deadline** of a corresponding task. Herein, the number of the current time indicator is
A value...
...updated, thereby scheduling the tasks by a relative priority for the time indicator without a **priority** re-allocation process of the **tasks** .

The quantum (q) is **calculated** by dividing the longest deadline among deadlines of tasks to be scheduled by the number...

...priority level, and expressed as a following formula 1.
Herein, the Tmax)) denotes a maximum **deadline** , and the k denotes the number of bits allocated for a priority level.
A **priority** level of each **task** (Pi))) is **calculated** by a following **formula** 2.
Herein, di)) denotes a **deadline** of a corresponding task.
Also, the time indicator C is updated by a following formula...

...showing a bitmap structure applied to the EDF scheduling method of the present invention. Once **priorities** of **tasks** to be scheduled are determined by using the **formulas** 1 and 2, a corresponding priority bit is set to the bitmap and the time...

...Figures 4A to 4C.
Figures 4A to 4C are exemplary views for explaining that a priority of each task is determined as time elapses.
As shown in Figure 4A, the T1 having a period of 2...

...T3 having a period of 15 reach to a scheduler in time '0', the scheduler determines priorities of the tasks by using the formulas 1 and 2.
In time '0', the maximum deadline Tmax)) of said three tasks is 13 which is equal to the period of the T3...

...In a second embodiment of the present invention, when it is supposed that the shortest deadline among deadlines of tasks to be scheduled is Tmin)) and the longest deadline is Tmax)), a quantum q(m) relevant to the mth) time indicator is obtained by a following...

...of a priority level relevant to each time indicator and is obtained by a following formula 5.
Herein, the k denotes the number of a priority level bit.
A priority (Pi))) of a task having a deadline which is in a range of 2m-1)Tmin)) (equivalent to) 2m)Tmin)) is obtained...

...CLAIMS tasks;
updating current time as the lowest priority; and
processing the tasks in a shortest- deadline -first order from the updated lowest priority on a temporal axis.
2. The method of...

...wherein if the number of tasks is less than that of the priority level, a priority of each task is determined as a value obtained by dividing a value obtained by dividing a deadline di)) of...

...claim 4, wherein the specific time unit is a value obtained by dividing the maximum deadline by the number of a priority level.
7. The method of claim 4, wherein the...

...by dividing a value obtained by dividing current time of a system by the maximum deadline by the specific time unit.
9. The method of claim 2 or 3, wherein if the number of tasks is less than the number of a priority level, a priority of each task (Pi))) is calculated by a following formula of in which the di)) denotes a deadline of a corresponding task, Tmax)) denotes a maximum deadline , and the q denotes a specific time unit.
10. The method of claim 9, wherein...

...of claim 10, wherein the specific time unit is calculated by a formula of q = Tmax))2k).
12. The method of claim 11, wherein current time is updated by a formula ...

```
? ds

Set     Items   Description
S1     1138982  TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
                IES OR ACTION? ? OR EVENT? ?
S2      111034  S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
                 WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
                ING OR SORT??? OR ORDER???)
S3        3176  DEADLINE OR DUE()DATE
S4          50  (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
                EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5        4538  S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6       13203  S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
                 OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
                OR DERIV???)
S7      615654  DIVID??? OR DIVISION OR MOD
S8        7322  TMAX OR T()MAX
S9        2916  S2(5N)MEASUR???
S10          3  S4(100N)(S5:S6 OR S9)
S11         45  (S5:S6 OR S9)(50N)S3
S12          1  (S5:S6 OR S9)(50N)S3(50N)S8
? s s10:s11 not s12
              45  S10:S11
               1  S12
```

```
     S13       44  S10:S11 NOT S12
? S s13 AND PY=1978:2003
               44  S13
          2522236  PY=1978 : PY=2003
     S14       26  S13 AND PY=1978:2003
? S s13 AND (AC=US OR AC=US/PR) AND AY=1978:2003
               44  S13
          1305866  AC=US
          1305470  AC=US/PR
          2923327  AY=1978 : AY=2003
     S15       26  S13 AND (AC=US OR AC=US/PR) AND AY=1978:2003
?
? ds

Set     Items   Description
S1    1138982   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2     111034   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3       3176   DEADLINE OR DUE()DATE
S4         50   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5       4538   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      13203   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     615654   DIVID??? OR DIVISION OR MOD
S8       7322   TMAX OR T()MAX
S9       2916   S2(5N)MEASUR???
S10         3   S4(100N)(S5:S6 OR S9)
S11        45   (S5:S6 OR S9)(50N)S3
S12         1   (S5:S6 OR S9)(50N)S3(50N)S8
S13        44   S10:S11 NOT S12
S14        26   S13 AND PY=1978:2003
S15        26   S13 AND (AC=US OR AC=US/PR) AND AY=1978:2003
? s s14:s15
     S16       33  S14:S15
? idpat
     S17       33  IDPAT (sorted in duplicate/non-duplicate order)

Summary:
S17 has 33 records ordered as follows:
     2 patent groups (records 1-4)
    29 patent records without duplicates (records 5-33)

Group Table:
   Groups    Total      Primary   Record    Duplicates    Record
             in Group   Records   Numbers                 Numbers
   ------    --------   -------   -------   ----------    -------
    G1          2        F348       1-2
    G2          2        F348         3
                         F349         4

1. Show Group Table    4. TYPE or PRINT Selected Records
2. Show Summary        5. TYPE or PRINT Primary and Non-Duplicate Records
3. Quit

Enter an option (e.g., 4).
? 3
Exiting IDPAT.
? t/ti/all

 17/TI/1     (Item 1 from file: 348)
DIALOG(R)File 348:(c) 2007 European Patent Office. All rts. reserv.

Event reminder method
Ereigniserinnerungsverfahren
Procede de rappel d'evenements


 17/TI/2     (Item 2 from file: 348)
```

Event reminder method
Ereigniserinnerungsverfahren
Procede de rappel d'evenements

17/TI/3   (Item 3 from file: 348)

TASK SCHEDULING AND MESSAGE PASSING
TASKREIHENFOLGEPLANUNG UND NACHRICHTENUBERTRAGUNG
ORDONNANCEMENT DE TACHES ET PASSAGE DE MESSAGES

17/TI/4   (Item 4 from file: 349)

TASK SCHEDULING AND MESSAGE PASSING
ORDONNANCEMENT DE TACHES ET PASSAGE DE MESSAGES

17/TI/5   (Item 5 from file: 348)

Distributed real time operating system
Verteiltes Echtzeitbetriebssystem
Systeme d'exploitation de temps reel distribue

17/TI/6   (Item 6 from file: 348)

System and method for managing direct mail campaigns
Verfahren und System zur Verwaltung von Direkt-Mail-Kampagnen
Procede et systeme pour la gestion de campagnes de marketing direct par e-mail

17/TI/7   (Item 7 from file: 348)

Energy-aware scheduling of application execution
Energiebewusste Taskreihenfolgeplanung
Ordonnancement des taches tenant compte des aspects energetiques

17/TI/8   (Item 8 from file: 348)

PRODUCTION MANAGEMENT SYSTEM PRODUCTION MANAGEMENT METHOD
PRODUKTIONSVERWALTUNGSSYSTEM, PRODUKTIONSVERWALTUNGSVERFAHREN
SYSTEME DE GESTION DE PRODUCTION ET PROCEDE DE GESTION DE PRODUCTION

17/TI/9   (Item 9 from file: 348)

Finance applying method on electronic commerce system
Verfahren fur Finanzdienstleistungen in einem elektronischen Handelsystem
Methode financiere appliquee a un systeme de commerce electronique

17/TI/10   (Item 10 from file: 348)

Printing materials production supporting apparatus, printing materials production supporting system, printing materials production supporting programm, and printing materials production supporting method
Apparat, System, Verfahren und Programm zum Unterstutzen der Druckmaterialherstellung
Appareil, systeme, methode et programme pour le soutien de la production de

materiaux d'impression

17/TI/11 (Item 11 from file: 348)

Media accelerator
Mediumbeschleuniger
Accelerateur de media

17/TI/12 (Item 12 from file: 348)

Persistent data storage techniques
Dauerhafte Datenspeichertechnik
Technique de stockage persistant de donnees

17/TI/13 (Item 13 from file: 348)

TRANSACTION SUPPORTING FACILITY AND TRANSACTION SUPPORTING METHOD
TRANSAKTIONSUNTERSTUTZUNGSEINRICHTUNG UND TRANSAKTIONSUNTERSTUTZUNGSVERFAHREN
DISPOSITIF DE SUPPORT DE TRANSACTIONS ET PROCEDE DE SUPPORT DE TRANSACTIONS

17/TI/14 (Item 14 from file: 348)

User level scheduling of intercommunicating real-time tasks
Benutzerstufenplanung von kommunizierenden Echtzeitaufgaben
Ordonnancement au niveau utilisateur de taches temps-reel intercommunicantes

17/TI/15 (Item 15 from file: 348)

Control system
Steuerungssystem
Systeme de commande

17/TI/16 (Item 16 from file: 348)

Method and apparatus for providing an efficient use of telecommunication network resources
Verfahren und Vorrichtung zur effizienten Nutzung von Fernmeldenetzressourcen
Procede et dispositif pour l'usage efficace des ressources d'un reseau de telecommunication

17/TI/17 (Item 17 from file: 348)

Computer system having a DSP local bus.
Rechnersystem mit einem lokalen Bus eines Digitalsignalprozessors.
Systeme d'ordinateur a bus local de processeur de signaux numeriques.

17/TI/18 (Item 18 from file: 348)

Multi-media computer operating system and method
Multimediarechnerbetriebssystem und -verfahren
Systeme et methode d'exploitation d'un ordinateur multi-media

17/TI/19 (Item 19 from file: 349)

AN END USER ORIENTED WORKFLOW APPROACH INCLUDING STRUCTURED PROCESSING OF AD HOC WORKFLOWS WITH A COLLABORATIVE PROCESS ENGINE
APPROCHE DU FLUX DES TRAVAUX ORIENTEE UTILISATEUR FINAL COMPRENANT UN TRAITEMENT STRUCTURE DES FLUX DES TRAVAUX AD HOC AU MOYEN D'UN MOTEUR DE TRAITEMENT COLLABORATIF

17/TI/20 (Item 20 from file: 349)

SCHEDULING RESOURCES FOR PERFORMING A SERVICE
PLANIFICATION DE RESSOURCES POUR L'EXECUTION D'UN SERVICE

17/TI/21 (Item 21 from file: 349)

SCHEDULING TASKS ACROSS MULTIPLE LOCATIONS
PLANIFICATION DE TACHES SUR PLUSIEURS LIEUX

17/TI/22 (Item 22 from file: 349)

A USER INTERFACE FOR SCHEDULING TASKS
INTERFACE UTILISATEUR PERMETTANT DE PLANIFIER DES TACHES

17/TI/23 (Item 23 from file: 349)

CONSTRAINT-BASED PRODUCTION PLANNING AND SCHEDULING
PLANIFICATION ET ORDONNANCEMENT DE PRODUCTION FONDES SUR DES CONTRAINTES

17/TI/24 (Item 24 from file: 349)

SYSTEMS AND METHODS FOR PROVIDING QOS ENVIRONMENT
SYSTEMES ET PROCEDES PERMETTANT DE FOURNIR UN ENVIRONNEMENT DE QUALITE DE SERVICE

17/TI/25 (Item 25 from file: 349)

APPARATUS AND METHOD FOR OPTIMIZED AND SECURED REFLECTION OF NETWORK SERVICES TO REMOTE LOCATIONS
APPAREIL ET PROCEDE DE REFLEXION OPTIMISEE ET SECURISEE DE SERVICES DE RESEAU VERS DES EMPLACEMENTS A DISTANCE

17/TI/26 (Item 26 from file: 349)

METHOD AND SYSTEM FOR ALLOCATING A BUDGET SURPLUS TO A TASK
PROCEDE ET SYSTEME D'ALLOCATION D'UN EXCEDENT DE BUDGET A UNE TACHE

17/TI/27 (Item 27 from file: 349)

METHODS AND APPARATUS FOR SHARING SLACK IN A TIME-PARTITIONED SYSTEM
PROCEDES ET APPAREIL DE PARTAGE D'ECART DANS UN SYSTEME DE REPARTITION DE TEMPS

17/TI/28 (Item 28 from file: 349)

METHODS AND APPARATUS FOR SLACK STEALING WITH DYNAMIC TRHEADS
PROCEDES ET APPAREIL DE DETOURNEMENT DE MARGE AVEC DES FILS DYNAMIQUES

17/TI/29 (Item 29 from file: 349)

WORK FLOW SYSTEM
SYSTEME DE DEROULEMENT DU TRAVAIL

17/TI/30 (Item 30 from file: 349)

METHOD AND SYSTEM FOR EXECUTING FINANCIAL TRANSACTIONS VIA A COMMUNICATION MEDIUM
PROCEDE ET SYSTEME D'EXECUTION DE TRANSACTIONS FINANCIERES VIA UN MOYEN DE COMMUNICATION

17/TI/31 (Item 31 from file: 349)

METHOD OF SEQUENCING CHRONIC DISEASE TESTING, REPORTING AND EVALUATION
METHODES DE SEQUENCEMENT DES OPERATIONS DE TEST, DE COMMUNICATION ET D'EVALUATION DANS LE CADRE DE LA GESTION DE MALADIES CHRONIQUES

17/TI/32 (Item 32 from file: 349)

ZERO OVERHEAD COMPUTER INTERRUPTS WITH TASK SWITCHING
INTERRUPTIONS INFORMATIQUES A TEMPS SYSTEME ZERO, AVEC COMMUTATION DE TACHES

17/TI/33 (Item 33 from file: 349)

A TELECOMMUNICATIONS PERFORMANCE MANAGEMENT SYSTEM
SYSTEME DE GESTION DE PERFORMANCES EN TELECOMMUNICATIONS
? t/3,k/1,3,5-33

17/3,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01990166
Event reminder method
Ereigniserinnerungsverfahren
Procede de rappel d'evenements
PATENT ASSIGNEE:
  Research in Motion, (5178490), 295 Phillip Street, Waterloo,Ontario N2L 3W8, (CA), (Proprietor designated states: all)
INVENTOR:
  Lau, Anthony P., 1708-600 Greenfield Avenue, KitchenerOntario, N2C 2J9, (CA)
  Curelet-Balan, Gheorghe, 58 Highpark Avenue, KitchenerOntario, N2C 2C, (CA)
LEGAL REPRESENTATIVE:
  Hibbert, Juliet Jane Grace et al (79376), Kilburn & Strode, 20 Red Lion Street, London WC1R 4PJ, (GB)
PATENT (CC, No, Kind, Date): EP 1603301 A1 051207 (Basic)
                             EP 1603301 B1 070307
APPLICATION (CC, No, Date): EP 2005017557 030506;
PRIORITY (CC, No, Date): US 377644 P 020506
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR; HU; IE; IT; LI; LU; MC; NL; PT; RO; SE; SI; SK; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK
RELATED PARENT NUMBER(S) - PN (AN):
  EP 1361727 (EP 2003252820)

INTERNATIONAL PATENT CLASS (V7): H04L-029/06; G06F-017/60
INTERNATIONAL CLASSIFICATION (V8 + ATTRIBUTES):
IPC + Level Value Position Status Version Action Source Office:
  H04L-0029/06   A I F B 20060101 20060710 H EP
  G06Q-0010/00   A I L B 20060101 20060710 H EP
ABSTRACT WORD COUNT: 42
NOTE:
  Figure number on first page: NONE

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200549	547
CLAIMS B	(English)	200710	476
CLAIMS B	(German)	200710	553
CLAIMS B	(French)	200710	531
SPEC A	(English)	200549	3922
SPEC B	(English)	200710	3943
Total word count - document A			4470
Total word count - document B			5503
Total word count - documents A + B			9973

...SPECIFICATION not limited to these examples. A plurality of examples and possible states may exist.
The **priority** 56 of an **event** 50 is **defined** preferably as the **importance** of the **event** 50 and may be set to low, normal or high. This setting is based on the urgency of the event 50.
The **deadline** 58 of an event 50 is defined preferably as the limiting factor of the event. The event 50 is completed whenever the **deadline** 58 requirements are satisfied. When the deadline 58 is set, a reminder 60 may be...

...SPECIFICATION not limited to these examples. A plurality of examples and possible states may exist.
The **priority** 56 of an **event** 50 is **defined** preferably as the **importance** of the **event** 50 and may be set to low, normal or high. This setting is based on the urgency of the event 50.
The **deadline** 58 of an event 50 is defined preferably as the limiting factor of the event. The event 50 is completed whenever the **deadline** 58 requirements are satisfied. When the deadline 58 is set, a reminder 60 may be...

17/3,K/3 (Item 3 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01236438
TASK SCHEDULING AND MESSAGE PASSING
TASKREIHENFOLGEPLANUNG UND NACHRICHTENUBERTRAGUNG
ORDONNANCEMENT DE TACHES ET PASSAGE DE MESSAGES
PATENT ASSIGNEE:
  Honeywell Inc., (2927097), 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245, (US), (Proprietor designated states: all)
INVENTOR:
  BINNS, Pamela, A., 13 Spring Farm Lane, St. Paul, MN 55127, (US)
  VESTAL, Stephen, C., 13 Spring Farm Lane, St. Paul, MN 55127, (US)
LEGAL REPRESENTATIVE:
  Haley, Stephen (79721), Gill Jennings & Every, Broadgate House, 7 Eldon Street, London EC2M 7LH, (GB)
PATENT (CC, No, Kind, Date): EP 1244963 A2 021002 (Basic)
                              EP 1244963 B1 031105
                              WO 2000070455 001123
APPLICATION (CC, No, Date):   EP 2000930754 000515; WO 2000US13356 000515
PRIORITY (CC, No, Date): US 312592 990514
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-009/46
NOTE:
  No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200345	1002
CLAIMS B	(German)	200345	889
CLAIMS B	(French)	200345	1295
SPEC B	(English)	200345	8139
Total word count - document A			0
Total word count - document B			11325
Total word count - documents A + B			11325

...SPECIFICATION The invention addresses deterministic communication between two periodic processes. It includes a communication model, a **deadline** reduction technique, a period transformation technique and implementation efficiency buffer assignment rules.

In one embodiment, the invention provides a method of generating an assigned scheduling **priority** of a plurality of **tasks** in a multitask system, comprising:

defining a first list of the plurality of tasks, wherein the first list of the plurality of tasks is sorted with a task **deadline** as a primary key and a task criticality as a secondary key;

transforming the task **deadline** of each of the plurality of tasks one at a time using a transformation scenario...at action box 1110. Internal deadlines are set in action box 1115 such that the **deadline** of every sender task is strictly less than the **deadline** of all its receivers. The list is then sorted by internal **deadline** in action box 1115. Internal criticalities are set in action box 1125 to remove conflicts. Decision box 1130 **determines** if multiple **tasks** in the **sorted** list have equal internal deadlines. If yes, the portion or portions of the list having...

...receive undelayed messages for each processor begins at action box 1140. The list generated in **action** box 1140 is **sorted** by user-specified **deadline** in **action** box 1145. Decision box 1150 **determines** if multiple **tasks** in the **sorted** list have equal user-specified deadlines. If yes, the portion or portions of the list...

...this example via controlled run-time time slicing, into a task with smaller period and **deadline** and consequently higher **priority** .

The transformation **algorithm** operates on **tasks** one at a time, starting with the task having least **deadline** . The list of tasks can be viewed as a concatenation of sublists HELpU where p...

...among software task objects and hardware objects. Task priorities are assigned inversely with period or **deadline** , so that tasks with shorter periods or deadlines have higher scheduling priorities. Periods of high ...

...into smaller pieces that are sequentially dispatched at higher rates where the initial assignment of **priority** is inconsistent with **task** criticality. System models **define** electronic systems and instructions for carrying out the scheduling and message passing of the multitask...

17/3,K/5 (Item 5 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

01907926

Distributed real time operating system

Verteiltes Echtzeitbetriebssystem

Systeme d'exploitation de temps reel distribue

PATENT ASSIGNEE:

Rockwell Automation Technologies, Inc., (3877880), 1 Allen-Bradley Drive, Mayfield Heights, OH 44124, (US), (Applicant designated States: all)

INVENTOR:

Sivaram, Balasubramanian, 35800 Sedge Circle, Solon, OH 44139, (US)

LEGAL REPRESENTATIVE:

Englaender, Klaus, Dipl.-Ing. et al (3423), Jung HML Patentanwalte Schraudolphstrasse 3, 80799 Munchen, (DE)

PATENT (CC, No, Kind, Date): EP 1538497 A2 050608 (Basic)

APPLICATION (CC, No, Date): EP 2004028839 041206;

PRIORITY (CC, No, Date): US 729478 031205

DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR;
  HU; IE; IS; IT; LI; LT; LU; MC; NL; PL; PT; RO; SE; SI; SK; TR
EXTENDED DESIGNATED STATES: AL; BA; HR; LV; MK; YU
INTERNATIONAL PATENT CLASS (V7): G05B-019/042
ABSTRACT WORD COUNT: 106
NOTE:
  Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200523	1270
SPEC A	(English)	200523	7239
Total word count - document A			8509
Total word count - document B			0
Total word count - documents A + B			8509

...SPECIFICATION message 91 form a part and is determined prior to application program based on the importance of its control **task** as **determined** by the user.
  The scheduling data 100 may also include an execution period (EP) indicating...

...to be necessary to execute the message for transmission on the network 31 and a **deadline** period (DP) being in this case the portion of the completion timing constraint t1)) allocated...

17/3,K/6 (Item 6 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01743099
System and method for managing direct mail campaigns
Verfahren und System zur Verwaltung von Direkt-Mail-Kampagnen
Procede et systeme pour la gestion de campagnes de marketing direct par e-mail
PATENT ASSIGNEE:
  Xerox Corporation, (219004), Patent Department, Xerox Square - 20 A, 100 Clinton Avenue South, Rochester, New York 14644, (US), (Applicant designated States: all)
INVENTOR:
  Kanzinger, Charles G., 59 West Bel Meadow Lane South, Russell, OH 44022, (US)
  Zhang, Qing, 1109 Fireside Trail, Broadview Heights Ohio 44147, (US)
  Insolia, Chet C., 4829 Galaxy Parkway, Cleveland, OH 44128, (US)
  Skalinder, Brian T., 1730 Liberty Drive, Akron, OH 44313-6344, (US)
  Rane, Geetanjali, 10298 Thompson Rye Circle, Twinsburg Ohio 44087, (US)
  Chang, Chen-hu, 2325 White Marsh Drive, Twinsburg Ohio 44087, (US)
  Marshall, Shampra, 4426 Secton Road, Cleveland, OH 44105, (US)
LEGAL REPRESENTATIVE:
  Grunecker, Kinkeldey, Stockmair & Schwanhausser Anwaltssozietat (100721), Maximilianstrasse 58, 80538 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 1426893 A1 040609 (Basic)
APPLICATION (CC, No, Date): EP 2003027466 031201;
PRIORITY (CC, No, Date): US 430192 P 021202; US 446593 030528
DESIGNATED STATES: DE; FR; GB
EXTENDED DESIGNATED STATES: AL; LT; LV; MK
INTERNATIONAL PATENT CLASS (V7): G06F-017/60
ABSTRACT WORD COUNT: 133
NOTE:
  Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200424	246
SPEC A	(English)	200424	11701
Total word count - document A			11947
Total word count - document B			0
Total word count - documents A + B			11947

...SPECIFICATION List contains the following columns Job ID, Job Title, Status, Job Phase, Job Manager and **Due Date** . A list of jobs is displayed. The list of jobs is retrieved based on options **defined** for the page. The **Job List** is **sorted** based on the Sort Options **defined** in the Options Page. The Select Check Boxes on the left side of each job ...

...are the Job ID, Job Title, Status, Job Phase, Job Manager First Name, Job Manager **Last** Name and **Due Date** . Each column title invokes functionality that sets the Order By Field. This document refers to these columns as **Job List sort** columns.
To **define** the sort order by displayed columns, the user enters a list of Column Names, separated by commas. The available sortable columns are: Job ID, Job Title, Status, **Due Date** , Job Manager Last Name, Job Manager First Name and Job Phase. To set the Job...

17/3,K/7 (Item 7 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01660552
Energy-aware scheduling of application execution
Energiebewusste Taskreihenfolgeplanung
Ordonnancement des taches tenant compte des aspects energetiques
PATENT ASSIGNEE:
Texas Instruments Incorporated, (279078), 7839 Churchill Way, Mail Station 3999, Dallas, Texas 75251, (US), (Applicant designated States: all)
INVENTOR:
Chauvel, Gerard, Residence du Valbosquet '20, 292 Chemin du Valbosquet, 06600, Antibes, (FR)
D'inverno, Dominique, 47 Chemin des Basses Ginestieres, 06270, Villeneuve-Loubet, (FR)
Lasserre, Serge, 278 Rue du Marsaou Lieudit St. Jean de Cannes, 83600, Frejus, (FR)
Kuusela, Maija, 320 Chemin de L'Ouvaire, 06370, Mouans Sartoux, (FR)
Cabillic, Gilbert, 10 Rue de Normandie, 35530, Brece, (FR)
Lesot, Jean-Philippe, La Geraudiere, 35370, Etrelles, (FR)
Banatre, Michel, 28 Rue de la Masse, 35111, La Fresnais, (FR)
Parain, Frederic, 6 Mail Anne Catherine, 35000, Rennes, (FR)
Routeau, Jean-Paul, 8, Rue La Chalotais, 35235, Thorigne-Fouillard, (FR)
Majoul, Salam, 13, Rue Denis Papin, 35000, Rennes, (FR)
LEGAL REPRESENTATIVE:
Holt, Michael (50428), Texas Instruments Limited European Patents Department PO Box 5069, Northampton, NN4 7ZE, (GB)
PATENT (CC, No, Kind, Date): EP 1365312 A1 031126 (Basic)
APPLICATION (CC, No, Date): EP 2003101437 030520;
PRIORITY (CC, No, Date): US 151282 020520
DESIGNATED STATES: DE; FR; GB
EXTENDED DESIGNATED STATES: AL; LT; LV; MK
INTERNATIONAL PATENT CLASS (V7): G06F-001/32; G06F-009/46
ABSTRACT WORD COUNT: 150
NOTE:
Figure number on first page: 6

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200348	278
SPEC A	(English)	200348	3109
Total word count - document A			3387
Total word count - document B			0
Total word count - documents A + B			3387

...SPECIFICATION all tasks have been executed (i=m) in block 48.
A pseudo-code of this **procedure** is given below:
1: for each **task** T taken by **order** of increasing deadlines do
2: for each processor P taken by order of increasing consumption for the execution of T do
3: if T executed on P completes before its **deadline** then
4: put T on P according to its **deadline** and break to the next task
5: end if

6: end for
7: abort (No...

...deal with temporal constraints, all tasks assigned to a processor are executed according to their **deadline** , from the earliest to the latest. Thus, before assigning a task to a processor, the scheduler verifies that the task will not prevent another task, with a later **deadline** , to complete before its **deadline** - in such a case, the **procedure** must reject this placement.

The pseudocode of this **procedure** is shown below:

1: for each **task** T taken by **order** of decreasing (delta)(T) do

2: for each processor P taken by order of increasing...

...execution of T do

3: if the placement of T on P does not introduce **deadline** miss for T or an already placed task then

4: put T on P according...

...T3)) is put on processor P0)), then task T5)) (previously scheduled) cannot complete before its **deadline** , whereas when T3)) is put on processor P1)), task T4 cannot complete before its schedule...

...as shown in Figure 5b. As can be seen, in some instances, the power-aware **procedure** places too much importance on power consumption, and the **ordering** of **tasks** lists by increasing deadlines is not sufficient to provide a good temporal behavior of the...

17/3,K/8 (Item 8 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01556069
PRODUCTION MANAGEMENT SYSTEM PRODUCTION MANAGEMENT METHOD
PRODUKTIONSVERWALTUNGSSYSTEM, PRODUKTIONSVERWALTUNGSVERFAHREN
SYSTEME DE GESTION DE PRODUCTION ET PROCEDE DE GESTION DE PRODUCTION
PATENT ASSIGNEE:
Class Technology Co., Ltd., (2728531), 35-4, Yoyogi 1-chome, Shibuya-ku, Tokyo 151-0053, (JP), (Applicant designated States: all)
INVENTOR:
YOKOYAMA, Hiroshi, c/o Class Techn. Co., Ltd. 35-4,Yoyogi 1-chome, Shibuya-ku, Tokyo 151-0053, (JP)
LEGAL REPRESENTATIVE:
Murgatroyd, Susan Elizabeth et al (55511), Baron & Warren, 19 South End, Kensington, London W8 5BU, (GB)
PATENT (CC, No, Kind, Date): EP 1416347 A1 040506 (Basic)
WO 2003007098 030123
APPLICATION (CC, No, Date): EP 2002745927 020710; WO 2002JP7013 020710
PRIORITY (CC, No, Date): JP 2001211287 010711; JP 2002193879 020702
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G05B-019/418; G06F-017/60
ABSTRACT WORD COUNT: 175
NOTE:
Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; Japanese
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200419	1410
SPEC A	(English)	200419	25239
Total word count - document A			26649
Total word count - document B			0
Total word count - documents A + B			26649

...SPECIFICATION production planning regardless of whether an order acceptance is present or not. Due to such **procedure** , non-ordered post-supplementary production and the planned production both occupying the manufacturing resources have often prevailed over a **job order** production and delayed the **due date** thereof, leading to decrease the opportunities of order acceptance.

In view of the problems as...

17/3,K/9 (Item 9 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01529467
Finance applying method on electronic commerce system
Verfahren fur Finanzdienstleistungen in einem elektronischen Handelsystem
Methode financiere appliquee a un systeme de commerce electronique
PATENT ASSIGNEE:
Hitachi Ltd., (204155), 6, Kanda Surugadai 4-chome, Chiyoda-ku, Tokyo, (JP), (Applicant designated States: all)
INVENTOR:
Kamada, Yoshiharu, c/o Hitachi Ltd., 5-1, Marunouchi 1-chome, Chiyoda-ku, Tokyo 100-8220, (JP)
Tomita, Hiroshi, c/o Hitachi Ltd., 5-1, Marunouchi 1-chome, Chiyoda-ku, Tokyo 100-8220, (JP)
Yoshida, Takahiro, c/o Hitachi Ltd., 5-1, Marunouchi 1-chome, Chiyoda-ku, Tokyo 100-8220, (JP)
LEGAL REPRESENTATIVE:
Calderbank, Thomas Roger et al (50122), MEWBURN ELLIS York House 23 Kingsway, London WC2B 6HP, (GB)
PATENT (CC, No, Kind, Date): EP 1276070 A1 030115 (Basic)
APPLICATION (CC, No, Date): EP 2002251490 020304;
PRIORITY (CC, No, Date): JP 2001213033 010713
DESIGNATED STATES: DE; GB
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-017/60
ABSTRACT WORD COUNT: 166
NOTE:
Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200303	872
SPEC A	(English)	200303	7662
Total word count - document A			8534
Total word count - document B			0
Total word count - documents A + B			8534

...SPECIFICATION creates determined-order data 201 including the type, the number/quantity, the unit price, the **deadline** , or the like of commodities of which the buyer will place an order, then transmitting the determined-order data to the center site 101. The center site 101 registers the **determined - order** data 201 into the **transaction** -related data DB 104 and, although not illustrated, notifies the seller 130 that the order...

17/3,K/10 (Item 10 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01482030
Printing materials production supporting apparatus, printing materials production supporting system, printing materials production supporting programm, and printing materials production supporting method
Apparat, System, Verfahren und Programm zum Unterstutzen der Druckmaterialherstellung
Appareil, systeme, methode et programme pour le soutien de la production de materiaux d'impression
PATENT ASSIGNEE:
Fuji Photo Film Co., Ltd., (2602261), 210 Nakanuma, Minami-Ashigara-shi, Kanagawa 250-0123, (JP), (Applicant designated States: all)
INVENTOR:
Honda, Hachirou, c/o Fuji Photo Film Co., Ltd., 798, Miyanodai, Kaisei-machi, Ashigarakami-gun, Kanagawa 258-8538, (JP)
Ohtsu, Takatoshi, c/o Fuji Photo Film Co., Ltd., 798, Miyanodai, Kaisei-machi, Ashigarakami-gun, Kanagawa 258-8538, (JP)

Fujitani, Naohiro, c/o Fuji Photo Film Co., Ltd., 26-30, Nishiazabu 2-chome, Minato-ku, Tokyo 106-8620, (JP)
Miyaki, Hiroshi, c/o Fuji Photo Film Co., Ltd., 26-30, Nishiazabu 2-chome, Minato-ku, Tokyo 106-8620, (JP)
Potts, Robert E., Jr., 98 South Street, West Borough, MA 01581, (US)
Reedman, Norman, 2 Fairfield Drive, King City, Ontario L7B 1L8, (CA)
LEGAL REPRESENTATIVE:
Klunker . Schmitt-Nilson . Hirsch (101001), Winzererstrasse 106, 80797 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 1253535 A2 021030 (Basic)
EP 1253535 A3 040414
APPLICATION (CC, No, Date): EP 2002007654 020404;
PRIORITY (CC, No, Date): US 828467 010409
DESIGNATED STATES: DE; FR; GB
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-017/60
ABSTRACT WORD COUNT: 208
NOTE:
Figure number on first page: 2

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200244	1067
SPEC A	(English)	200244	11184
Total word count - document A			12251
Total word count - document B			0
Total word count - documents A + B			12251

...SPECIFICATION job is defined by defining "Job Info" (FIG. 11), "Client Info" (FIG. 12) and "Service/ **Deadline** " (FIG. 13).
"Job Info" is the definition of the job itself. In this case, "Client No.", " **Job** Name", " **Deadline** Date & Time" and " **Priority** " are **defined** as " **Job** Info" and, if necessary, comments and memorandum on the job are described in "Description" box...

17/3,K/11 (Item 11 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01440537
Media accelerator
Mediumbeschleuniger
Accelerateur de media
PATENT ASSIGNEE:
Texas Instruments Incorporated, (279078), 7839 Churchill Way, Mail Station 3999, Dallas, Texas 75251, (US), (Applicant designated States: all)
INVENTOR:
Milovanovic, Rajko, 5824 Pathfinder Trail, 75093, Plano, (US)
Thrift, Philip R., 7900 Churchill Way no. 2304, Dallas 75251, Texas, (US)
LEGAL REPRESENTATIVE:
Holt, Michael et al (50422), Texas Instruments Ltd., EPD MS/13, 800 Pavilion Drive, Northampton Business Park, Northampton NN4 7YL, (GB)
PATENT (CC, No, Kind, Date): EP 1229444 A1 020807 (Basic)
APPLICATION (CC, No, Date): EP 2001000681 011129;
PRIORITY (CC, No, Date): US 253848 P 001129
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-009/48
ABSTRACT WORD COUNT: 39
NOTE:
Figure number on first page: 2A

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200232	241
SPEC A	(English)	200232	9059
Total word count - document A			9300

Total word count - document B 0
Total word count - documents A + B 9300

...SPECIFICATION underscore)GET(underscore)STATS (memory utilized, cycles utilized, quality level, rate, percent of buffers meeting **deadline** , quality level needed for meeting **deadline**).
- The IDSPScheduler provides QoS scheduling and **event** notification:
- IDSPQoS(underscore) **priority** () is **computed** based on the time-criticality to meet presentation **deadline** . If the highest priority component cannot be rum, the IDSPScheduler analyzes the environment and sends...

17/3,K/12 (Item 12 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01417096
Persistent data storage techniques
Dauerhafte Datenspeichertechnik
Technique de stockage persistant de donnees
PATENT ASSIGNEE:
Miosoft Corporation, (3178060), 15503 NW 12th Place, Pembroke Pines, Florida 33028, (US), (Applicant designated States: all)
INVENTOR:
Barabas, Albert B., 6301 Offshore Drive No. 108, Madison, Wisconsin 53705 , (US)
Siepman, Ernst M., 15503 NW 12th Place, Pembroke Pines, Florida 33028, (US)
Van Gulik, Mark D. A., 6401 Offshore Drive, No. 309, Madison, Wisconsin 53705, (US)
LEGAL REPRESENTATIVE:
Deans, Michael John Percy (30022), M.J.P. Deans, Lane End House Hookley Lane, Elstead Surrey GU8 6JE, (GB)
PATENT (CC, No, Kind, Date): EP 1197876 A2 020417 (Basic)
EP 1197876 A3 030416
APPLICATION (CC, No, Date): EP 2000310170 001116;
PRIORITY (CC, No, Date): US 687941 001013; US 688309 001013; US 687027 001013; US 687942 001013; US 687861 001013; US 687765 001013; US 687694 001013; US 687268 001013
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-017/30
ABSTRACT WORD COUNT: 100
NOTE:
Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200216	2328
SPEC A	(English)	200216	20807

Total word count - document A 23135
Total word count - document B 0
Total word count - documents A + B 23135

...SPECIFICATION run as soon as possible. Several basic mechanisms exist to support this need.
In a **deadline** -based soft real-time priority scheme, each job has associated with it a time. It...

...by this time. Unfortunately, this interferes with OID-sorting. To resolve this conflict, the following **algorithm** is used. At any point in time a JEP has a heap of **jobs** , **sorted** by expiration time. The **job** execution process looks at the top element of the heap. This is the job with the earliest **deadline** , possibly in the past if we're temporarily overloaded. Jobs are popped from the heap...

17/3,K/13 (Item 13 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01362119
TRANSACTION SUPPORTING FACILITY AND TRANSACTION SUPPORTING METHOD
TRANSAKTIONSUNTERSTUTZUNGSEINRICHTUNG UND TRANSAKTIONSUNTERSTUTZUNGSVERFAHREN
DISPOSITIF DE SUPPORT DE TRANSACTIONS ET PROCEDE DE SUPPORT DE TRANSACTIONS
PATENT ASSIGNEE:
Dojo, Makoto, (3899270), 1178-2, Kitanosyo-cho, Omihachiman-shi, Shiga 523-0806, (JP), (Applicant designated States: all)
INVENTOR:
DOJO, Makoto, Loop-M 1203, 3-9-10 Kaigan, Minato-ku, Tokyo 108-0022, (JP)
DOJO, Kenshin, Musee d'art Gotenyama 205, 4-7-10 Kitashinagawa, Shinagawa-ku, Tokyo 140-0001, (JP)
TSUJIOKA, Hayato, 95-103, Yasukiyohigashi-cho, Hikone-shi Shiga 522-0008, (JP)
KANEKO, Masato, 3-2-21-A106, Tarumachi Kohoku-ku, Yokohama-shi Kanagawa 222-0001, (JP)
LEGAL REPRESENTATIVE:
Jenkins, Peter David et al (55201), PAGE WHITE & FARRER 54 Doughty Street , London WC1N 2LS, (GB)
PATENT (CC, No, Kind, Date): EP 1284464 A1 030219 (Basic)
WO 2001075721 011011
APPLICATION (CC, No, Date): EP 2001904401 010213; WO 2001JP988 010213
PRIORITY (CC, No, Date): JP 2000101610 000403; JP 2000111332 000412
DESIGNATED STATES: DE; FR; GB; IT
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-017/60; B65G-001/137
ABSTRACT WORD COUNT: 118
NOTE:
Figure number on first page: 05

LANGUAGE (Publication,Procedural,Application): English; English; Japanese
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200308	5183
SPEC A	(English)	200308	24508
Total word count - document A			29691
Total word count - document B			0
Total word count - documents A + B			29691

...SPECIFICATION of data.
Furthermore, in cases where combinations have not been determined even after the desired **deadline** for the determination of matching has passed, it is extremely convenient for the re-inputting...
...or shippers Y can ascertain how far they must negotiate in terms of conditions in **order to find a transaction** partner. Accordingly, in the present embodiment, a fuzzy searching means 81 is provided which is ...

17/3,K/14 (Item 14 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01174898
User level scheduling of intercommunicating real-time tasks
Benutzerstufenplanung von kommunizierenden Echtzeitaufgaben
Ordonnancement au niveau utilisateur de taches temps-reel intercommunicantes
PATENT ASSIGNEE:
MITSUBISHI DENKI KABUSHIKI KAISHA, (208589), 2-3, Marunouchi 2-chome, Chiyoda-ku, Tokyo 100-8310, (JP), (Applicant designated States: all)
INVENTOR:
Shen, Chia, 3 Apache Trail, Arlington, Massachusetts, 02474, (US)
Gomez, Oscar J. Gonzalez, 45, Salem Place, Amherst, Massachusetts, 01002, (US)
LEGAL REPRESENTATIVE:
Pfenning, Meinig & Partner GbR (100967), Mozartstrasse 17, 80336 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 1024429 A2 000802 (Basic)
EP 1024429 A3 021218

APPLICATION (CC, No, Date): EP 99122335 991109;
PRIORITY (CC, No, Date): US 239583 990128
DESIGNATED STATES: DE; FR; GB
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-009/48; G06F-009/54
ABSTRACT WORD COUNT: 95
NOTE:
Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200031	404
SPEC A	(English)	200031	4764
Total word count - document A			5168
Total word count - document B			0
Total word count - documents A + B			5168

...SPECIFICATION SB tasks are assigned to the Pone) band, and will have priorities according to a **deadline** monotonic **algorithm** . That is, within the Pone) band, SB **tasks** have unique **priorities** **determined** by the deadlines of the SB tasks. In many tasks, e.g., plant monitoring, there...

...AN data with timing constraints are initially assigned to priority Pfour) band according to the **deadline** monotonic **algorithm** , and promoted to Ptwo) when a **deadline** is imminent. All the non real-time **tasks** are assigned a **priority** in the Pthree) band. These priorities can either be assigned according to their requested execution...

17/3,K/15 (Item 15 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00970329
Control system
Steuerungssystem
Systeme de commande
PATENT ASSIGNEE:
ROLLS-ROYCE PLC, (256920), 65 Buckingham Gate, London, SW1E 6AT, (GB), (Applicant designated States: all)
INVENTOR:
Bate, Iain, 2 Walney Road, York, YO3 0AJ, (GB)
Burns, Alan, 23 Nunthrop Avenue, York, YO2 1PF, (GB)
PATENT (CC, No, Kind, Date): EP 880094 A2 981125 (Basic)
EP 880094 A3 030813
APPLICATION (CC, No, Date): EP 98303886 980518;
PRIORITY (CC, No, Date): GB 9710522 970523
DESIGNATED STATES: DE; FR; GB
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-009/46
ABSTRACT WORD COUNT: 128
NOTE:
Figure number on first page: NONE
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9848	331
SPEC A	(English)	9848	2212
Total word count - document A			2543
Total word count - document B			0
Total word count - documents A + B			2543

...SPECIFICATION a value once read.
2. Each task has attributes associated with it, including:
a) its **deadline** , which is the time within which the **task** must be completed;
b) its **priority** , which **defines** when the **task** must be executed in relation to other tasks;
c) its period, which is used in...

17/3,K/16 (Item 16 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00897509
Method and apparatus for providing an efficient use of telecommunication network resources
Verfahren und Vorrichtung zur effizienten Nutzung von Fernmeldenetzressourcen
Procede et dispositif pour l'usage efficace des ressources d'un reseau de telecommunication
PATENT ASSIGNEE:
AT&T Corp., (589370), 32 Avenue of the Americas, New York, NY 10013-2412, (US), (Applicant designated States: all)
INVENTOR:
Bergholm, Joseph O., 23 Galloping Hill Circle, Holmdel, New Jersey 07733, (US)
Davis, John Michael, 105 Hudson Avenue, Red Bank, New Jersey 07701, (US)
Lee, Shui Yee, 24 East Lawn Drive, Holmdel, New Jersey 07733, (US)
Nadji, Behzad, 176 Fox Hill Drive, Little Silver, New Jersey 07739, (US)
Ting, Peter Di-Hsian, 18 East Lawn Drive, Holmdel, New Jersey 07733, (US)
LEGAL REPRESENTATIVE:
Kuhnen & Wacker (101501), Patentanwaltsgesellschaft mbH, Alois-Steinecker-Strasse 22, 85354 Freising, (DE)
PATENT (CC, No, Kind, Date): EP 820203 A2 980121 (Basic)
EP 820203 A3 000426
APPLICATION (CC, No, Date): EP 97112051 970715;
PRIORITY (CC, No, Date): US 680943 960715
DESIGNATED STATES: DE; FR; GB
EXTENDED DESIGNATED STATES: AL; LT; LV; RO; SI
INTERNATIONAL PATENT CLASS (V7): H04Q-003/00; H04M-003/42; H04M-003/22
ABSTRACT WORD COUNT: 79
NOTE:
Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9804	454
SPEC A	(English)	9804	8058
Total word count - document A			8512
Total word count - document B			0
Total word count - documents A + B			8512

...SPECIFICATION window then provides information about the order including the order ID, the version number, the due date and so forth. Information can be edited in these windows in a manner similar to that which we have described before.
The first phase of the new connect procedures is finished when the order entry activities are completed, i.e, when all of the activities defined for the order up to but not including the design link activity are completed. When all order entry...

17/3,K/17 (Item 17 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00684855
Computer system having a DSP local bus.
Rechnersystem mit einem lokalen Bus eines Digitalsignalprozessors.
Systeme d'ordinateur a bus local de processeur de signaux numeriques.
PATENT ASSIGNEE:
International Business Machines Corporation, (200120), Old Orchard Road, Armonk, N.Y. 10504, (US), (applicant designated states: DE;FR;GB)
INVENTOR:
Baker, Robert Grover, 2112 NW 1st Avenue, Delray Beach, Florida 33444-4341, (US)
Huynh, Duy Quoc, 2600 Greenwood Terrace No G209, Boca Raton, Florida 33431, (US)

Moeller, Dennis Lee, 7430 Rosewood Circle, Boca Raton, Florida 33487, (US)
Swingle, Paul Richard, 3727 NW 9th Street, Delray Beach, Florida 33445, (US)
Tran, Loc Tien, 19107 Fairlawn Way, Boca Raton, Florida 33434, (US)
Yong, Suksoon, 10299 186th Court So, Boca Raton, Florida 33498, (US)
LEGAL REPRESENTATIVE:
Williams, Julian David (75461), IBM United Kingdom Limited, Intellectual Property Department, Hursley Park, Winchester, Hampshire SO21 2JN, (GB)
PATENT (CC, No, Kind, Date): EP 654743 A1 950524 (Basic)
APPLICATION (CC, No, Date): EP 94308516 941117;
PRIORITY (CC, No, Date): US 155311 931119
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS (V7): G06F-013/40; G06F-013/364;
ABSTRACT WORD COUNT: 142

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB95	983
SPEC A	(English)	EPAB95	6914
Total word count - document A			7897
Total word count - document B			0
Total word count - documents A + B			7897

...SPECIFICATION by ordering the currently active tasks by the relative completion deadlines with the earliest completion **deadline** having highest priority. Although the above references disclose methods for **determining** the **priority** of **tasks** based on their respective "urgency," the complication of having tasks interrupted and the overhead involved...

17/3,K/18 (Item 18 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00551421
Multi-media computer operating system and method
Multimediarechnerbetriebssystem und -verfahren
Systeme et methode d'exploitation d'un ordinateur multi-media
PATENT ASSIGNEE:
International Business Machines Corporation, (200120), Old Orchard Road, Armonk, N.Y. 10504, (US), (Proprietor designated states: all)
INVENTOR:
Carmon, Donald Edward, 6 Eastwind Place, Chapel Hill, NC 27514, (US)
LEGAL REPRESENTATIVE:
de Pena, Alain (15151), Compagnie IBM France Departement de Propriete Intellectuelle, 06610 La Gaude, (FR)
PATENT (CC, No, Kind, Date): EP 553588 A2 930804 (Basic)
EP 553588 A3 940126
EP 553588 B1 990901
APPLICATION (CC, No, Date): EP 92480201 921222;
PRIORITY (CC, No, Date): US 829201 920131
DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FR; GB; GR; IT; LI; NL; PT; SE
INTERNATIONAL PATENT CLASS (V7): G06F-009/46
ABSTRACT WORD COUNT: 148
NOTE:
Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	845
SPEC A	(English)	EPABF1	13943
Total word count - document A			14788
Total word count - document B			0
Total word count - documents A + B			14788

...CLAIMS highest priority said entry in said queue corresponding to the earliest said task execution completion **deadline** ;
means for searching said queue to **find** the highest **priority**

said entry having a task which is found ready to begin execution; and
means for causing the commencement of execution...

17/3,K/19 (Item 19 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01180423 **Image available**
AN END USER ORIENTED WORKFLOW APPROACH INCLUDING STRUCTURED PROCESSING OF AD HOC WORKFLOWS WITH A COLLABORATIVE PROCESS ENGINE
APPROCHE DU FLUX DES TRAVAUX ORIENTEE UTILISATEUR FINAL COMPRENANT UN TRAITEMENT STRUCTURE DES FLUX DES TRAVAUX AD HOC AU MOYEN D'UN MOTEUR DE TRAITEMENT COLLABORATIF
Patent Applicant/Assignee:
SAP AKTIENGESELLSCHAFT, Neurottstrasse 16, 69190 Walldorf, DE, DE (Residence), DE (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
WODTKE Dirk, 212 Valencia Avenue, Aptos, CA 95003, US, US (Residence), DE (Nationality), (Designated only for: US)
JORDT Nicolai, Ahornweg 4, 74918 Angelbachtal, DE, DE (Residence), DE (Nationality), (Designated only for: US)
KRUSE Matthias, 1429 Page Street, San Francisco, CA 94117, US, US (Residence), DE (Nationality), (Designated only for: US)
Legal Representative:
ALBERT Philip H (et al) (agent), Townsend and Townsend and Crew LLP, Two Embarcadero Center, 8th floor, San Francisco, CA 94111-3834, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 2004102454 A2-A3 20041125 (WO 04102454)
Application: WO 2004US14216 20040507 (PCT/WO US04014216)
Priority Application: US 2003469051 20030507
Designated States:
(All protection types applied unless otherwise stated - for applications 2004+)
AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM
DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC
LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO
RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PL PT RO
SE SI SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) BW GH GM KE LS MW MZ NA SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 4839

Fulltext Availability:
Detailed Description

Detailed Description
... purchase order, etc.), and context of the belonging workflow instance (preceding step in the process, due date of the process, etc.).

Handling of obsolete activities/work items
For simplicity, the user interaction...

...already
1 1
entered phases can be deleted. Tasks get assigned to phases. By assigning tasks to- phases, the order in which the tasks will be executed is defined . If there is more than one task assigned to a phase, all tasks in this...

17/3,K/20 (Item 20 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01136314 **Image available**
SCHEDULING RESOURCES FOR PERFORMING A SERVICE

PLANIFICATION DE RESSOURCES POUR L'EXECUTION D'UN SERVICE
Patent Applicant/Assignee:
  SAP AG, Neurottstrasse 16, 69190 Walldorf, DE, DE (Residence), DE
    (Nationality)
Inventor(s):
  COLLE Renzo, Hermannstr. 1, 76530 Baden-Baden, DE,
  DOLESCHEL Stefan, 266 Iven Avenue, St. Davids, PA 19087, US,
  HOLLICH Franz, Zur Schanz 14, 74889 Sinsheim, DE,
  STRUMBERGER Dagmar, Sudetenstr. 8, 76694 Forst, DE,
Legal Representative:
  SCHIUMA Daniele (agent), Muller-Bore & Partner, Grafinger Str. 2, 81671
    Munchen, DE,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200459540 A1 20040715 (WO 0459540)
  Application: WO 2003EP13658 20031203 (PCT/WO EP03013658)
  Priority Application: US 2002433042 20021212; US 2003452383 20030305; US
    2003696498 20031030
Designated States:
(Protection type is "patent" unless otherwise stated - for applications
prior to 2004)
  AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM
  DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC
  LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH PL PT RO RU
  SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
  (EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE
  SI SK TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) BW GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 14815

Fulltext Availability:
  Detailed Description

Detailed Description
... also may be a dynamic priority that is determined by the system based on the **due date** of the task or the service order. The priority of a task may be changed by the scheduling system automatically without human I 0 intervention as time passes and the **due date** approaches. In some implementations, a combination of static priority and dynamic priority may be used. For example, a **priority** for a particular **task** may be **derived** based on an importance factor associated with the customer for whom the service is being performed and based on the **due date** of the task or service order.

  1 5 For each task in the hot list...

 17/3,K/21   (Item 21 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01130534   **Image available**
SCHEDULING TASKS ACROSS MULTIPLE LOCATIONS
PLANIFICATION DE TACHES SUR PLUSIEURS LIEUX
Patent Applicant/Assignee:
  SAP AG, Neurottstrasse 16, 69190 Walldorf, DE, DE (Residence), DE
    (Nationality)
Inventor(s):
  COLLE Renzo, Hermannstr. 1, 76530 Baden-Baden, DE,
  DOLESCHEL Stefan, 266 Iven Avenue, St. Davids, PA 19087, US,
  HOLLICH Franz, Zur Schanz 14, 74889 Sinsheim, DE,
  STRUMBERGER Dagmar, Sudetenstr. 8, 76694 Forst, DE,
Legal Representative:
  SCHIUMA Daniele (agent), Muller-Bore & Partner, Grafinger Str. 2, 81671
    Munchen, DE,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200453750 A1 20040624 (WO 0453750)
  Application: WO 2003EP13659 20031203 (PCT/WO EP03013659)
  Priority Application: US 2002433042 20021212; US 2003452383 20030305; US

2003696533 20031030
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE SI SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) BW GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 14666

Fulltext Availability:
Detailed Description

Detailed Description
... may be a dynamic priority
24
that is determined by the system based on the **due date** of the task or the service order. The priority of a task may be changed by the scheduling system automatically without human intervention as time passes and the **due date** approaches. In some implementations, a combination of static priority and dynamic priority may be used. For example, a **priority** for a particular **task** may be **derived** based on an importance factor associated with the customer for whom the service is being performed and based on the **due date** of the task or service order.

For each task in the hot list, the following...

17/3,K/22 (Item 22 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01130533 **Image available**
A USER INTERFACE FOR SCHEDULING TASKS
INTERFACE UTILISATEUR PERMETTANT DE PLANIFIER DES TACHES
Patent Applicant/Assignee:
SAP AG, Neurottstrasse 16, 69190 Walldorf, DE, DE (Residence), DE (Nationality)
Inventor(s):
COLLE Renzo, Hermannstr. 1, 76530 Baden-Baden, DE,
DOLESCHEL Stefan, 266 Iven Avenue, St. Davids, PA 19087, US,
HOLLICH Franz, Zur Schanz 14, 74889 Sinsheim, DE,
MALCHAREK Arnim, Lochheimer Str. 33, 69724 Heidelberg, DE,
Legal Representative:
SCHIUMA Daniele (agent), Muller-Bore & Partner, Grafinger Str. 2, 81671 Munchen, DE,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200453749 A1 20040624 (WO 0453749)
Application: WO 2003EP13657 20031203 (PCT/WO EP03013657)
Priority Application: US 2002433042 20021212; US 2003452383 20030305; US 2003696773 20031030
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE SI SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) BW GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English

Fulltext Word Count: 15171

Fulltext Availability:
  Detailed Description

Detailed Description
... also may be a dynamic priority that is determined by the system based on the due date of the task or the service order. The priority of a task may be changed by the scheduling system automatically without human intervention as time passes and the due date approaches. In some implementations, a combination of static priority and dynamic priority may be used.

For example, a **priority** for a particular **task** may be **derived** based on an importance factor
24
associated with the customer for whom the service is being performed and based on the due date of the task or service order.

For each task in the hot list, the following...

17/3,K/23 (Item 23 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01064278 **Image available**
CONSTRAINT-BASED PRODUCTION PLANNING AND SCHEDULING
PLANIFICATION ET ORDONNANCEMENT DE PRODUCTION FONDES SUR DES CONTRAINTES
Patent Applicant/Assignee:
  MANUGISTICS INC, 9715 Key West Avenue, Rockville, MD 20850, US, US (Residence), US (Nationality)
Inventor(s):
  JORDAN David, c/o Manugistics House, The Arena, 3 Downshire Way, Bracknell, Berkshire, RG 12 1PU, GB,
  JOHNSTON Paul, c/o Manugistics House, The Arena, 3 Downshire Way, Bracknell, Berkshire, RG 12 1PU, GB,
  TAYLOR Brian, c/o Manugistics House, The Arena, 3 Downshire Way, Bracknell, Berkshire, RG 12 1PU, GB,
Legal Representative:
  CROWSON Celine Jimenez (et al) (agent), Hogan & Hartson, L.L.P., 555 Thirteenth Street, N.W., Washington, DC 20004, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200394107 A2-A3 20031113 (WO 0394107)
  Application: WO 2003US13723 20030502 (PCT/WO US03013723)
  Priority Application: US 2002377252 20020502
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
  (EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE SI SK TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 9094

Patent and Priority Information (Country, Number, Date):
  Patent: ... 20031113
Fulltext Availability:
  Detailed Description
Publication Year: 2003

Detailed Description
... phase 710, which does a top-down pass, in descending priority of independent demand (earliest due date first +/- priority shift), allocating on-hand supplies and known arrivals of critical materials. The

output...

...to be scheduled with the correct net quantities.

At the next step 720, the system calculates the relative priorities of all activities to be scheduled. The priorities are also the earliest permission to start date of each activity. The priorities are based...

17/3,K/24 (Item 24 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01058339 **Image available**
SYSTEMS AND METHODS FOR PROVIDING QOS ENVIRONMENT
SYSTEMES ET PROCEDES PERMETTANT DE FOURNIR UN ENVIRONNEMENT DE QUALITE DE SERVICE
Patent Applicant/Assignee:
NEXT GENERATION SYSTEMS INC, P.O. Box 31205, Dayton, OH 45437-0205, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
WARDEN Gary G, 4285 US Rte 40, Tipp City, OH 45371, US, US (Residence), US (Nationality), (Designated only for: US)
CUNNINGHAM James A, 114 Peach Orchard Ave., Dayton, OH 45419, US, US (Residence), US (Nationality), (Designated only for: US)
KRAGICK Nathan A, 3331 Maplewood Drive, Beavercreek, OH 45434, US, US (Residence), US (Nationality), (Designated only for: US)
Legal Representative:
BERRIER Mark L (agent), Gray Cary Ware & Freidenrich LLP, 1221 S. MoPac Expressway, Suite 400, Austin, TX 78746-6875, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200388586 A1 20031023 (WO 0388586)
Application: WO 2003US10614 20030408 (PCT/WO US0310614)
Priority Application: US 2002371198 20020409
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE SI SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 13216

Patent and Priority Information (Country, Number, Date):
Patent: ... 20031023
Fulltext Availability:
Detailed Description
Publication Year: 2003

Detailed Description
... 9.4)
Destination Nx-Port: The Nx-Port to which a frame is targeted.

Earliest Deadline First: An algorithm that schedules events to occur in order of their proximity to a deadline . The most critical event is the one whose time is closest to expiring.

Exchange: The...

17/3,K/25 (Item 25 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01020731 **Image available**
APPARATUS AND METHOD FOR OPTIMIZED AND SECURED REFLECTION OF NETWORK SERVICES TO REMOTE LOCATIONS
APPAREIL ET PROCEDE DE REFLEXION OPTIMISEE ET SECURISEE DE SERVICES DE RESEAU VERS DES EMPLACEMENTS A DISTANCE
Patent Applicant/Assignee:
VIRTUAL LOCALITY LTD, Ha'Gavish Street 4, Sapir Industrial Park, 42101 Netanya, IL, IL (Residence), IL (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
HELFMAN Nadav Binyamin, Ha'sha'haf Street 6a, 30500 Binyamina, IL, IL (Residence), IL (Nationality), (Designated only for: US)
Legal Representative:
AGMON Jonathan (et al) (agent), SOROKER-AGMON, Advocates and Patent Attorneys, Nolton House, 14 Shenkar Street, Herzliya Pituach 46725, IL,

Patent and Priority Information (Country, Number, Date):
Patent: WO 200350641 A2-A3 **20030619** (WO 0350641)
Application: WO 2002IL991 20021209 (PCT/WO IL02000991)
Priority Application: US 2001337795 20011210
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SI SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 9677

Patent and Priority Information (Country, Number, Date):
Patent: ... **20030619**
Fulltext Availability:
Detailed Description
Publication Year: **2003**

Detailed Description
... the higher is the priority. A batch manager module 660 takes segments from long batch **transactions** at a **rate** , which is **determined** by the PCF value and the presence of previous segments in the priority queue. The...

...keep-alive" rate. The priority management according to the TET value is actually an Earliest **Deadline** First (EDF) management policy that

17/3,K/26 (Item 26 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01014732 **Image available**
METHOD AND SYSTEM FOR ALLOCATING A BUDGET SURPLUS TO A TASK
PROCEDE ET SYSTEME D'ALLOCATION D'UN EXCEDENT DE BUDGET A UNE TACHE
Patent Applicant/Assignee:
KONINKLIJKE PHILIPS ELECTRONICS N V, Groenewoudseweg 1, NL-5621 BA Eindhoven, NL, NL (Residence), NL (Nationality)
Inventor(s):
OTERO PEREZ Clara M, Prof. Holstlaan 6, NL-5656 AA Eindhoven, NL,
Legal Representative:
GROENENDAAL Antonius W M (agent), Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven, NL,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200344655 A2-A3 **20030530** (WO 0344655)
Application: WO 2002IB3986 20020925 (PCT/WO IB2002003986)
Priority Application: EP 2001204415 20011119

Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  CN JP KR
  (EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SK TR
Publication Language: English
Filing Language: English
Fulltext Word Count: 4876

Patent and Priority Information (Country, Number, Date):
  Patent: ... **20030530**
Fulltext Availability:
  Detailed Description
  Claims
Publication Year: **2003**

Detailed Description
... algorithms amounts to the specification of the method of assigning priorities to tasks. A scheduling **algorithm** is said to be static if priorities are assigned to **tasks** once and for all. A static scheduling algorithm is also called a fixed priority scheduling **algorithm** . With respect to achievable processor utilization, it can be shown that the rate-monotonic priority assignment is optimal for a fixed priority assignment rule. A scheduling **algorithm** is said to be dynamic if **priorities** of **tasks** might change from request to request. A well-known dynamic scheduling **algorithm** is the deadline driven scheduling **algorithm** . With this **algorithm** , **priorities** are assigned to **tasks** according to the deadlines of their current requests. A scheduling **algorithm** is said to be a mixed scheduling **algorithm** if the **priorities** of some of the **tasks** are fixed and the **priorities** of 0 the remaining **tasks** vary from request to request. Unused processor capacity is often called slack time. It results...

Claim
... first task.

2 A method according to claim 1, wherein a fixed priority based scheduling **algorithm** is applied and said scheduling characteristics correspond to a period and a **priority** 1 5 of the first **task** .

3 A method according to claim 1, wherein a **deadline** driven based scheduling **algorithm** is applied and said scheduling characteristics correspond to a period and a **deadline** of the first task.

4 A system (400) for scheduling a first task and a...

17/3,K/27 (Item 27 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00920193 **Image available**
METHODS AND APPARATUS FOR SHARING SLACK IN A TIME-PARTITIONED SYSTEM
PROCEDES ET APPAREIL DE PARTAGE D'ECART DANS UN SYSTEME DE REPARTITION DE TEMPS
Patent Applicant/Assignee:
  HONEYWELL INTERNATIONAL INC, 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960, US, US (Residence), US (Nationality)
Inventor(s):
  BINNS Pamela A, 13 Spring Farm Lane, North Oaks, MN 55127, US,
  LARSON Aaron R, 342 Lilac Lane, Shoreview, MN 55126, US,
Legal Representative:
  CRISS Roger H (et al) (agent), Honeywell International Inc., 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200254238 A2-A3 **20020711** (WO 0254238)
  Application: WO 2001US17746 20010601 (PCT/WO US01017746)
  Priority Application: US 2000751834 20001229
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB

GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA
MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA
UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 26865

Patent and Priority Information (Country, Number, Date):
Patent: ... **20020711**
Fulltext Availability:
Detailed Description
Claims
Publication Year: **2002**

Detailed Description
... of periodic and aperiodic tasks. For periodic tasks, priorities are assigned inversely with period or **deadline** , so that tasks with shorter periods or deadlines have higher scheduling **priorities** . Aperiodic **tasks** axe also assigned a **rate** or period that **determines** the slack request level, but the priorities of aperiodic tasl@,s are dynamic when they...

Claim
... priority level, taking into
account tasks that are activating and inactivating; and
allocating slack to **tasks** in **order** of **priority** .

2 The method of claim 1, wherein **tasks** are scheduled according to a **rate**
monotonic **algorithm** .

3 The method of claim 1, wherein an aperiodic high **priority** **task** can steal slack from a periodic low **priority** **task** without impacting the latter's execution **deadline** .

4 The method of claim 1, wherein determining available slack comprises:
determining slack consumed;
determining...

...inactivating; and
allocating slack to requesting tasks.

12 The method of claim I 1, wherein **tasks** are scheduled according to a **rate** monotonic **algorithm** .

13 The method of claim 1 1, wherein each **task** has an assigned **priority** , and wherein an aperiodic high **priority** **task** can steal slack from a periodic low priority task without impacting the latter's execution **deadline** .
86
. The method of claim I 1, wherein determining available slack comprises:
determining slack consumed...

17/3,K/28 (Item 28 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00920192 **Image available**
METHODS AND APPARATUS FOR SLACK STEALING WITH DYNAMIC TRHEADS
PROCEDES ET APPAREIL DE DETOURNEMENT DE MARGE AVEC DES FILS DYNAMIQUES
Patent Applicant/Assignee:
HONEYWELL INTERNATIONAL INC, 101 Columbia Road, P.O. Box 2245,
Morristown, NJ 07962, US, US (Residence), US (Nationality)
Inventor(s):
BINNS Pamela A, 13 Spring Farm Lane, North Oaks, MN 55127, US,
Legal Representative:
CRISS Roger H (et al) (agent), Honeywell International Inc., 101 Columbia

Road, P.O. Box 2245, Morristown, NJ 07960, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200254237 A2-A3 **20020711** (WO 0254237)
  Application: WO 2001US17738 20010601 (PCT/WO US01017738)
  Priority Application: US 2000751955 20001229
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 26695

Patent and Priority Information (Country, Number, Date):
  Patent: ... **20020711**
Fulltext Availability:
  Detailed Description
Publication Year: **2002**

Detailed Description
... of periodic and aperiodic tasks. For periodic tasks, priorities are assigned inversely with period or **deadline** , so that tasks with shorter periods or deadlines have higher scheduling **priorities** . Aperiodic **tasks** are also assigned a **rate** or period that **determines** the slack request level, but the priorities of aperiodic tasks are dynamic when they are...

17/3,K/29 (Item 29 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00888175
WORK FLOW SYSTEM
SYSTEME DE DEROULEMENT DU TRAVAIL
Patent Applicant/Assignee:
  ILANGUA COM LIMITED, Link House, 140 The Broadway, Surbiton, Surrey KT6 7JE, GB, GB (Residence), GB (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
  SMITH Neil Geoffrey, 34 Headley, 92 King Charles Road, Surbiton, Surrey KT5 8QW, GB, GB (Residence), GB (Nationality), (Designated only for: US)
  RUINAT Chrystelle Claire, 34 Headley, 92 King Charles Road, Surbiton, Surrey KT5 8QW, GB, GB (Residence), FR (Nationality), (Designated only for: US)
Legal Representative:
  REDDIE & GROSE (agent), 16 Theobalds Road, London WC1X 8PL, GB,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200221357 A2 **20020314** (WO 0221357)
  Application: WO 2001GB4022 20010907 (PCT/WO GB0104022)
  Priority Application: GB 200022073 20000908
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English

Fulltext Word Count: 7590

Patent and Priority Information (Country, Number, Date):
  Patent: ... **20020314**
Fulltext Availability:
  Detailed Description
Publication Year: **2002**

Detailed Description
... that they are available for a sufficient period of time between now and the completion **deadline** for the job.

- 24
The resource engine requires jobs to be analysed and prioritised as...

...the information specified in the job, the size of the job, the stage of the **job** , the **job** **deadline** etc.

The **priority** of a **job** is **calculated** by taking the number of words left to translate and dividing this figure by the number of days left until the job completion **deadline** .

The translator is responsible for updating the system as they make progress on a job...

17/3,K/30 (Item 30 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00803563 **Image available**
METHOD AND SYSTEM FOR EXECUTING FINANCIAL TRANSACTIONS VIA A COMMUNICATION MEDIUM
PROCEDE ET SYSTEME D'EXECUTION DE TRANSACTIONS FINANCIERES VIA UN MOYEN DE COMMUNICATION
Patent Applicant/Assignee:
  01 INC, -, KY, -- (Residence), -- (Nationality)
Patent Applicant/Inventor:
  LEE Andre S, 118-2, Chungdam-dong, Kangnam-ku, Seoul, KR, KR (Residence), US (Nationality)
Legal Representative:
  DRIVAS Dimitrios T (et al) (agent), White & Case LLP, Patent Dept., 1155 Avenue of the Americas, New York, NY 10036, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200137116 A2 **20010525** (WO 0137116)
  Application: WO 2000US31272 20001114 (PCT/WO US0031272)
  Priority Application: US 99166112 19991116; US 2000176410 20000113; US 2000182998 20000216
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 22086

Patent and Priority Information (Country, Number, Date):
  Patent: ... **20010525**
Fulltext Availability:
  Detailed Description
Publication Year: **2001**

Detailed Description
... send to customers that contain information specified by the user 237, such as bill amount, due date and overdue interest rate. In My Billing Schedule 239, a user defines a fee schedule, overdue interest rate and the types of transactions that require the user's payment. A user may modify or set such Billing Schedule...

17/3,K/31 (Item 31 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00772922 **Image available**
METHOD OF SEQUENCING CHRONIC DISEASE TESTING, REPORTING AND EVALUATION
METHODES DE SEQUENCEMENT DES OPERATIONS DE TEST, DE COMMUNICATION ET D'EVALUATION DANS LE CADRE DE LA GESTION DE MALADIES CHRONIQUES
Patent Applicant/Inventor:
SHEA Robert S, 5705 W. 129th Street, Overland Park, KS 66209, US, US (Residence), US (Nationality)
MUSSATTO James J, 4424 W. 150th St., Leawood, KS 66224, US, US (Residence), US (Nationality)
Legal Representative:
STITT Richard P, 1000 Walnut St., Ste 1400, Kansas City, MO 64106, US
Patent and Priority Information (Country, Number, Date):
Patent: WO 200106429 A1 20010125 (WO 0106429)
Application: WO 2000US18780 20000708 (PCT/WO US0018780)
Priority Application: US 99353865 19990715
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
CA
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 10808

Patent and Priority Information (Country, Number, Date):
Patent: ... 20010125
Fulltext Availability:
Detailed Description
Publication Year: 2001

Detailed Description
... the progress of the sequence of events for the particular patient's test cycle in order to determine that the events of the schedule have taken place in a timely manner. In the Function Box 28...

...will be monitoring the transmittal of results to the selected parties in accordance with the due date established in the test clock
16
of Function Box 14, which was initialized originally according...

17/3,K/32 (Item 32 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00510309 **Image available**
ZERO OVERHEAD COMPUTER INTERRUPTS WITH TASK SWITCHING
INTERRUPTIONS INFORMATIQUES A TEMPS SYSTEME ZERO, AVEC COMMUTATION DE TACHES
Patent Applicant/Assignee:
XYRON CORPORATION,
DONOVAN Brian,
Inventor(s):
DONOVAN Brian,
Patent and Priority Information (Country, Number, Date):
Patent: WO 9941661 A1 19990819
Application: WO 99US2575 19990205 (PCT/WO US9902575)
Priority Application: US 9823333 19980213
Designated States:

(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW GH GM KE LS MW SD SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 4271

Patent and Priority Information (Country, Number, Date):
Patent: ... **19990819**
Fulltext Availability:
Detailed Description
Publication Year: **1999**

Detailed Description
... saves time over software methods.

The invention provides an additional benefit in that its task **deadline** priority counter ...like audio tasks, which can start off at a low priority.

Usually the CPU will **find** time to serve the lower **priority** **tasks** , as anytime before the next sample period is fine. Sometimes, however, the CPU has many high priority tasks. In such cases, this invention's task is **deadline** priority counter system gradually increases the priority of the lower priority tasks as their deadlines...

17/3,K/33 (Item 33 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00468036 **Image available**
A TELECOMMUNICATIONS PERFORMANCE MANAGEMENT SYSTEM
SYSTEME DE GESTION DE PERFORMANCES EN TELECOMMUNICATIONS
Patent Applicant/Assignee:
TELEFONAKTIEBOLAGET LM ERICSSON,
SERAJ Jila,
NEWCOMBE Adrian,
Inventor(s):
SERAJ Jila,
NEWCOMBE Adrian,
Patent and Priority Information (Country, Number, Date):
Patent: WO 9858501 A1 **19981223**
Application: WO 98IE24 19980401 (PCT/WO IE9800024)
Priority Application: IE 97448 19970616
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DE DK DK EE ES FI GB GE GH GM GW HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW GH GM KE LS MW SD SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 6431

Patent and Priority Information (Country, Number, Date):
Patent: ... **19981223**
Fulltext Availability:
Detailed Description
Publication Year: **1998**

Detailed Description
... The
- 19

scheduler has the ability to schedule the tasks
using a real time scheduling **algorithm** (e.g.

earliest **deadline** first or least slack time).

The scheduler should also understand the
relative **importance** **of** **tasks** to each other (i.e.
the ability to assign different priorities to
the tasks), The...

```
? ds

Set     Items   Description
S1    1138982   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
                IES OR ACTION? ? OR EVENT? ?
S2     111034   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
                 WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
                ING OR SORT??? OR ORDER???)
S3       3176   DEADLINE OR DUE()DATE
S4         50   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
                EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5       4538   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      13203   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
                 OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
                OR DERIV???)
S7     615654   DIVID??? OR DIVISION OR MOD
S8       7322   TMAX OR T()MAX
S9       2916   S2(5N)MEASUR???
S10         3   S4(100N)(S5:S6 OR S9)
S11        45   (S5:S6 OR S9)(50N)S3
S12         1   (S5:S6 OR S9)(50N)S3(50N)S8
S13        44   S10:S11 NOT S12
S14        26   S13 AND PY=1978:2003
S15        26   S13 AND (AC=US OR AC=US/PR) AND AY=1978:2003
S16        33   S14:S15
S17        33   IDPAT (sorted in duplicate/non-duplicate order)
? s (s5:s6 or s9)(50n)s3(50n)s7
           16419  S5:S6
            2916  S9
            3176  S3
          615654  S7
     S18       6  (S5:S6 OR S9)(50N)S3(50N)S7
? t/3,k/all
```

18/3,K/1 **(Item 1 from file: 348)**
DIALOG(R)File 348:EUROPEAN PATENTS

01881235
Improved EDF scheduling method
Ablauf-planungs-verfahren
Methode de planification
PATENT ASSIGNEE:
LG ELECTRONICS INC., (1914270), 20, Yoido-Dong,Youngdungpo-gu, Seoul, (KR), (Applicant designated States: all)
INVENTOR:
Park, Moon-Ju, 582-10, Changsin-dongJongno-Gu, Seoul, (KR)
LEGAL REPRESENTATIVE:
Katerle, Axel et al (9219091), Wuesthoff & Wuesthoff Patent- und Rechtsanwalte Schweigerstrasse 2, 81541 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 1522924 A2 050413 (Basic)
EP 1522924 A3 070509
APPLICATION (CC, No, Date): EP 2003021619 030925;
PRIORITY (CC, No, Date): KR 203050708 030723
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR; HU; IE; IT; LI; LU; MC; NL; PT; RO; SE; SI; SK; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK
INTERNATIONAL PATENT CLASS (V7): G06F-009/48
INTERNATIONAL CLASSIFICATION (V8 + ATTRIBUTES):
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G06F-0009/48 A I F B 20060101 20050209 H EP
ABSTRACT WORD COUNT: 86
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LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200515	476
SPEC A	(English)	200515	2265
Total word count - document A			2742
Total word count - document B			0
Total word count - documents A + B			2742

...SPECIFICATION tasks; updating current time as the lowest priority; and processing the tasks in a shortest- **deadline** -first order from the updated lowest priority on a temporal axis.
In the present invention...

...a priority level. If the number of the tasks is less than that of the **priority** level, a **priority** of each **task** is **determined** as a value obtained by dividing a value obtained by dividing a **deadline** di)) of a corresponding task by a maximum **deadline** Tmax)) by a specific time unit q. The maximum **deadline** is a relative **deadline** of a task having the longest period among the tasks, and the specific time unit is a value obtained by dividing the maximum **deadline** by the number of a priority level.
The current time is indicated by a current time indicator obtained by dividing a value obtained by dividing current time by the maximum **deadline** by the specific time unit.
In the EDF scheduling method according to another aspect of...

...tasks are grouped into several sets and one current time indicator is set to each **task** set.
A **priority** level (Pi))) of a **task** having a **deadline** which is in a range of 2m-1)Tmin)) (equivalent to) 2m)Tmin)) is obtained by a **formula** of wherein the q(m) denotes a time unit relevant to the mth) time indicator...

...of a priority level relevant to each current time indicator, and the di)) denotes a **deadline** of a corresponding task. Herein, the number of the current time indicator is
A value...
...which are illustrated in the accompanying drawings.
In the present invention, a temporal axis is **divided** into a quantum unit, then a priority and a time indicator for indicating current time...

...a relative priority for the time indicator without a priority re-allocation process of the **tasks** .
The quantum (q) is **calculated** by dividing the longest deadline among deadlines of tasks to be scheduled by the number...

...priority level, and expressed as a following formula 1.
Herein, the Tmax)) denotes a maximum **deadline** , and the k denotes the number of bits allocated for a priority level.
A **priority** level of each **task** (Pi))) is **calculated** by a following **formula** 2.
Herein, di)) denotes a **deadline** of a corresponding task.
Also, the time indicator C is updated by a following formula...

...showing a bitmap structure applied to the EDF scheduling method of the present invention. Once **priorities** of **tasks** to be scheduled are **determined** by using the **formulas** 1 and 2, a corresponding priority bit is set to the bitmap and the time...
...In a second embodiment of the present invention, when it is supposed that the shortest **deadline** among deadlines of tasks to be scheduled is Tmin)) and the longest **deadline** is Tmax)), a quantum q(m) relevant to the mth) time indicator is obtained by...

...of a priority level relevant to each time indicator and is obtained by a following **formula** 5.
Herein, the k denotes the number of a priority level bit.
A **priority** (Pi))) of a **task** having a **deadline** which is in a range of 2m-1)Tmin)) (equivalent to) 2m)Tmin)) is obtained...

...each case. Herein, the system using rate denotes a total sum of values obtained by **dividing** processing time of tasks or messages by their deadlines.

Accordingly, in case that the number...

...CLAIMS tasks;
updating current time as the lowest priority; and
processing the tasks in a shortest- **deadline** -first order from the updated lowest priority on a temporal axis.
2. The method of...

...wherein if the number of tasks is less than that of the priority level, a **priority** of each **task** is **determined** as a value obtained by dividing a value obtained by dividing a deadline di)) of...

...claim 4, wherein the specific time unit is a value obtained by dividing the maximum **deadline** by the number of a priority level.
7. The method of claim 4, wherein the...

...by dividing a value obtained by dividing current time of a system by the maximum **deadline** by the specific time unit.
9. The method of claim 2 or 3, wherein if the number of tasks is less than the number of a **priority** level, a **priority** of each **task** (Pi))) is **calculated** by a following **formula** of in which the di)) denotes a **deadline** of a corresponding task, Tmax)) denotes a maximum **deadline** , and the q denotes a specific time unit.
10. The method of claim 9, wherein the Tmax)) is a relative **deadline** of a task having the longest period among tasks.
11. The method of claim 10...

18/3,K/2 (Item 2 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01236438
TASK SCHEDULING AND MESSAGE PASSING
TASKREIHENFOLGEPLANUNG UND NACHRICHTENUBERTRAGUNG
ORDONNANCEMENT DE TACHES ET PASSAGE DE MESSAGES
PATENT ASSIGNEE:
Honeywell Inc., (2927097), 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245, (US), (Proprietor designated states: all)
INVENTOR:
BINNS, Pamela, A., 13 Spring Farm Lane, St. Paul, MN 55127, (US)
VESTAL, Stephen, C., 13 Spring Farm Lane, St. Paul, MN 55127, (US)
LEGAL REPRESENTATIVE:
Haley, Stephen (79721), Gill Jennings & Every, Broadgate House, 7 Eldon Street, London EC2M 7LH, (GB)
PATENT (CC, No, Kind, Date): EP 1244963 A2 021002 (Basic)
EP 1244963 B1 031105
WO 2000070455 001123
APPLICATION (CC, No, Date): EP 2000930754 000515; WO 2000US13356 000515
PRIORITY (CC, No, Date): US 312592 990514
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-009/46
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200345	1002
CLAIMS B	(German)	200345	889
CLAIMS B	(French)	200345	1295
SPEC B	(English)	200345	8139

Total word count - document A 0
Total word count - document B 11325
Total word count - documents A + B 11325

...SPECIFICATION Whenever possible, a task with high criticality but long

period is transformed so that a **deadline** monotonic priority assignment can be used. In one embodiment, period transformation is a form of controlled time-slicing. The compute time of the transformed task is **divided** by some integer value to arrive at a time slice for that task. A dispatch...

...task is suspended until its next resumption. The overall effect is to make a low **rate** **task** look like a high **rate** **task** with smaller **compute** time, and thus higher **priority** .

For period transformation of periodic **tasks** , the dispatches and resumptions are simply inserted into the proper cases of the dispatcher case...

...that do not send nor receive undelayed messages. The merged list is sorted with internal **deadline** as the primary key and internal criticality as the secondary key. The merged list is...

...in action box 1170 to generate the priority sorted list.

A task is transformed by **dividing** its period and compute time by some positive integer, thus converting it, in this example via controlled run-time time slicing, into a task with smaller period and **deadline** and consequently higher **priority** .

The transformation **algorithm** operates on **tasks** one at a time, starting with the task having least **deadline** . The list of tasks can be viewed as a concatenation of sublists HELpU where p...

18/3,K/3 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00920193 **Image available**
METHODS AND APPARATUS FOR SHARING SLACK IN A TIME-PARTITIONED SYSTEM
PROCEDES ET APPAREIL DE PARTAGE D'ECART DANS UN SYSTEME DE REPARTITION DE TEMPS
Patent Applicant/Assignee:
HONEYWELL INTERNATIONAL INC, 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960, US, US (Residence), US (Nationality)
Inventor(s):
BINNS Pamela A, 13 Spring Farm Lane, North Oaks, MN 55127, US,
LARSON Aaron R, 342 Lilac Lane, Shoreview, MN 55126, US,
Legal Representative:
CRISS Roger H (et al) (agent), Honeywell International Inc., 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200254238 A2-A3 20020711 (WO 0254238)
Application: WO 2001US17746 20010601 (PCT/WO US01017746)
Priority Application: US 2000751834 20001229
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 26865

Fulltext Availability:
Detailed Description

Detailed Description
... of periodic and aperiodic tasks. For periodic tasks, priorities are assigned inversely with period or **deadline** , so that tasks with shorter periods or deadlines have higher scheduling **priorities** . Aperiodic **tasks** axe also assigned a **rate** or period that **determines** the slack request level, but the priorities of aperiodic tasl@,s are dynamic when

they...
...task set is defined as one in which the period Tj of each task evenly divides Ti+

18/3,K/4 (Item 2 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00920192 **Image available**
METHODS AND APPARATUS FOR SLACK STEALING WITH DYNAMIC TRHEADS
PROCEDES ET APPAREIL DE DETOURNEMENT DE MARGE AVEC DES FILS DYNAMIQUES
Patent Applicant/Assignee:
HONEYWELL INTERNATIONAL INC, 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07962, US, US (Residence), US (Nationality)
Inventor(s):
BINNS Pamela A, 13 Spring Farm Lane, North Oaks, MN 55127, US,
Legal Representative:
CRISS Roger H (et al) (agent), Honeywell International Inc., 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200254237 A2-A3 20020711 (WO 0254237)
Application: WO 2001US17738 20010601 (PCT/WO US01017738)
Priority Application: US 2000751955 20001229
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 26695

Fulltext Availability:
Detailed Description

Detailed Description
... of periodic and aperiodic tasks. For periodic tasks, priorities are assigned inversely with period or **deadline** , so that tasks with shorter periods or deadlines have higher scheduling **priorities** . Aperiodic **tasks** are also assigned a **rate** or period that **determines** the slack request level, but the priorities of aperiodic tasks are dynamic when they are...task set is defined as one in which the period Tj of each task evenly **divides** Tj,j for i = 1, ..., n A harmonic task set comprises a plurality of tasks...

18/3,K/5 (Item 3 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00888175
WORK FLOW SYSTEM
SYSTEME DE DEROULEMENT DU TRAVAIL
Patent Applicant/Assignee:
ILANGUA COM LIMITED, Link House, 140 The Broadway, Surbiton, Surrey KT6 7JE, GB, GB (Residence), GB (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
SMITH Neil Geoffrey, 34 Headley, 92 King Charles Road, Surbiton, Surrey KT5 8QW, GB, GB (Residence), GB (Nationality), (Designated only for: US)
RUINAT Chrystelle Claire, 34 Headley, 92 King Charles Road, Surbiton, Surrey KT5 8QW, GB, GB (Residence), FR (Nationality), (Designated only for: US)
Legal Representative:

REDDIE & GROSE (agent), 16 Theobalds Road, London WC1X 8PL, GB,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200221357 A2 20020314 (WO 0221357)
  Application: WO 2001GB4022 20010907 (PCT/WO GB0104022)
  Priority Application: GB 200022073 20000908
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ
  EC EE ES FI GB GD GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS
  LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ
  TM TR TT TZ UA UG US UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 7590

Fulltext Availability:
  Detailed Description

Detailed Description
... For each of the prospective translators the system takes the size of the job and **divides** it by the word count that translator is able to achieve each day. This indicates...
...that they are available for a sufficient period of time between now and the completion **deadline** for the job.

- 24
The resource engine requires jobs to be analysed and prioritised as...

...the information specified in the job, the size of the job, the stage of the **job** , the **job** **deadline** etc.

The **priority** of a **job** is **calculated** by taking the number of words left to translate and **dividing** this figure by the number of days left until the job completion **deadline** .

The translator is responsible for updating the system as they make progress on a job...

18/3,K/6 (Item 4 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00757075 **Image available**
TASK SCHEDULING AND MESSAGE PASSING
ORDONNANCEMENT DE TACHES ET PASSAGE DE MESSAGES
Patent Applicant/Assignee:
  HONEYWELL INC, 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07962-2245, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
  BINNS Pamela A, 13 Spring Farm Lane, St. Paul, MN 55127, US, US (Residence), -- (Nationality), (Designated only for: US)
  VESTAL Stephen C, 13 Spring Farm Lane, St. Paul, MN 55127, US, US (Residence), -- (Nationality), (Designated only for: US)
Legal Representative:
  CRISS Roger H, Honeywell Inc. (Law Dept., Attn: A. Olinger), 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07962-2245, US
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200070455 A2 20001123 (WO 0070455)
  Application: WO 2000US13356 20000515 (PCT/WO US0013356)
  Priority Application: US 99312592 19990514

Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH GM
  HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX
  NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
  (OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 12408

Fulltext Availability:
  Detailed Description

Detailed Description
... do not send nor receive unde@yed messages.

The merged list is sorted with internal **deadline** as the primary key and internal
21
criticality as the secondary key. The merged list...
...action box 1 170 to generate the priority sorted list.

A task is transformed by **dividing** its pcriod and compute time by some positive integer, thus converting it, in this example via controlled run-time time slicing, into a task with smaller period and **deadline** and consequently higher **priority** .

The transformation **algorithm** operates on **tasks** one at a tirne, starting with the task having least **deadline** . The list of tasks can be viewed as a concatenation of sublists HELp U where...
? t/9/2

18/9/2 (Item 2 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01236438
TASK SCHEDULING AND MESSAGE PASSING
TASKREIHENFOLGEPLANUNG UND NACHRICHTENUBERTRAGUNG
ORDONNANCEMENT DE TACHES ET PASSAGE DE MESSAGES
PATENT ASSIGNEE:
  Honeywell Inc., (2927097), 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245, (US), (Proprietor designated states: all)
INVENTOR:
  BINNS, Pamela, A., 13 Spring Farm Lane, St. Paul, MN 55127, (US)
  VESTAL, Stephen, C., 13 Spring Farm Lane, St. Paul, MN 55127, (US)
LEGAL REPRESENTATIVE:
  Haley, Stephen (79721), Gill Jennings & Every, Broadgate House, 7 Eldon Street, London EC2M 7LH, (GB)
PATENT (CC, No, Kind, Date): EP 1244963 A2 021002 (Basic)
                              EP 1244963 B1 031105
                              WO 2000070455 001123
APPLICATION (CC, No, Date): EP 2000930754 000515; WO 2000US13356 000515
PRIORITY (CC, No, Date): US 312592 990514
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-009/46
CITED REFERENCES (EP B):
  HIROYUKI KANEKO, JOHN A. STANKOVIC: "Integrated Scheduling of Multimedia and Hard Real-Time Tasks" PROCEEDINGS OF THE IEEE REAL-TIME SYSTEMS SYMPOSIUM,US,NEW YORK, IEEE, vol. SYMP. 17, 4 December 1996 (1996-12-04), pages 206-217, XP000659642 ISBN: 0-7803-3801-4
  STEVE VESPAL: "MetaH Support for Real-Time Multi-Processor Avionics" PROCEEDINGS OF 5TH INTERNATIONAL WORKSHOP ON PARALLEL AND DISTRIBUTED REAL-TIME SYSTEMS AND 3RD WORKSHOP ON OBJECT-ORIENTED REAL-TIME SYSTEMS, 1 - 3 April 1997, pages 11-21, XP002153417 Geneva, Switzerland
  SARA R. BIYABANI, JOHN A. STANKOVIC, KRITHI RAMAMRITHAM: "THE INTEGRATION

OF DEADLINE AND CRITICALNESS IN HARD REAL-TIME SCHEDULING" PROCEEDINGS OF THE REAL TIME SYSTEMS SYMPOSIUM,US,WASHINGTON, IEEE COMP. SOC. PRESS, vol. SYMP. 9, 6 December 1988 (1988-12-06), pages 152-160, XP000014046;

NOTE:
No A-document published by EPO

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Application:	010124	A2	International application entering European phase
Application:	021002	A2	Published application without search report
Examination:	021002	A2	Date of request for examination: 20020718
Examination:	030129	A2	Date of dispatch of the first examination report: 20021216
Grant:	031105	B1	Granted patent
Lapse:	040609	B1	Date of lapse of European Patent in a contracting state (Country, date): SE 20040205,
Lapse:	040623	B1	Date of lapse of European Patent in a contracting state (Country, date): FI 20031105, SE 20040205,
Lapse:	040728	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, FI 20031105, SE 20040205,
Lapse:	040811	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, CH 20031105, LI 20031105, FI 20031105, GR 20040205, NL 20031105, SE 20040205,
Lapse:	040728	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, FI 20031105, SE 20040205,
Lapse:	041006	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, CH 20031105, LI 20031105, DK 20040205, FI 20031105, GR 20040205, NL 20031105, SE 20040205,
Lapse:	040811	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, CH 20031105, LI 20031105, FI 20031105, GR 20040205, NL 20031105, SE 20040205,
Lapse:	041006	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, CH 20031105, LI 20031105, DK 20040205, FI 20031105, GR 20040205, NL 20031105, SE 20040205,
Oppn None:	041027	B1	No opposition filed: 20040806
Lapse:	041110	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, CH 20031105, LI 20031105, DK 20040205, ES 20040216, FI 20031105, GR 20040205, NL 20031105, SE 20040205,
Lapse:	041222	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, BE 20031105, CH 20031105, LI 20031105, DK 20040205, ES 20040216, FI 20031105, GR 20040205, NL 20031105, SE 20040205,
Lapse:	050316	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, BE 20031105, CH 20031105, LI 20031105, DK 20040205, ES 20040216, FI 20031105, GR 20040205, MC 20040531, NL 20031105, SE 20040205,
Lapse:	050608	B1	Date of lapse of European Patent in a contracting state (Country, date): AT 20031105, BE 20031105, CH 20031105, LI 20031105, DK 20040205, ES 20040216, FI 20031105, GR 20040205, LU 20040515, MC 20040531, NL 20031105, SE 20040205,
Lapse:	050615	B1	Date of lapse of European Patent in a contracting state (Country, date):

contracting state (Country, date): AT 20031105, BE 20031105, CH 20031105, LI 20031105, DK 20040205, ES 20040216, FI 20031105, GR 20040205, IE 20040517, LU 20040515, MC 20040531, NL 20031105, SE 20040205,

Change: 070221 B1 Title of invention (German) changed: 20070221
Change: 070221 B1 Title of invention (English) changed: 20070221
Change: 070221 B1 Title of invention (French) changed: 20070221
Change: 070829 B1 Title of invention (German) changed: 20070829
Change: 070829 B1 Title of invention (English) changed: 20070829
Change: 070829 B1 Title of invention (French) changed: 20070829

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200345	1002
CLAIMS B	(German)	200345	889
CLAIMS B	(French)	200345	1295
SPEC B	(English)	200345	8139
Total word count - document A			0
Total word count - document B			11325
Total word count - documents A + B			11325

SPECIFICATION EP 1244963 B1

Technical Field

The present invention relates generally to task scheduling and message passing within task systems, and in particular to modeling real-time periodic and aperiodic task scheduling and message passing adapted to analyze the timing behavior within multitask systems and to define electronic systems and instructions for carrying out such scheduling and message passing.

Background

Computer processes are often subdivided into a variety of functions which may be executed as tasks in serial and/or parallel fashion. These computer processes can be used to gather and act upon information, and to bring about some result in response to the information. These functional task systems find use in a variety of important environments. Examples may include monitor and control of an industrial process, such as a power generation and distribution system, or monitor and control of complex equipment, such as a commercial airliner.

Classical control functions rely on data flows between periodically executed tasks, with the results of a task delivered at the next dispatch of that task. This behavior allows cyclic data dependencies among tasks, i.e., feed-back loops, and is consistent with the assumptions underlying the mathematical analysis of discrete time dynamic systems. A message passing communication model is more suitable for partitioned multiprocessor systems than a shared memory communication model, especially systems that are loosely coupled to maintain a high degree of hardware fault isolation.

In many mission critical systems software needs to be modularized using an appropriate functional breakdown, which often requires decomposing a traditional control task into multiple communicating subtasks. This may require end-to-end ordering and scheduling of certain subtasks and messages. For example, in an avionics system, inertial measurement processing and autopiloting might be implemented as separate functions performed by separate task sets. There would be an end-to-end deadline from reading sensor data to outputting actuator commands, and task and message order dependencies within this deadline.

The increasing complexity of hardware makes it harder to accurately bound computation and communication times. Caches, for example, make it more difficult to accurately bound worst-case compute times, even for algorithms whose control flow is data-independent Actual worst-case compute times may be substantially less than bounds that can be easily established during development. Actual compute times may vary significantly across different dispatches of the same task. Systems will be designed so that only the more critical functions are guaranteed with highest assurance to be schedulable under worst-case compute time bounds. Load shredding of the less critical tasks will occur during any intervals of transient processor overload.

High-assurance systems have additional requirements. The dependency

ordering of computations and communications, and the exact times of interactions with the external world, must produce deterministic outcomes. Uncertainties or variations in task compute times must not affect the values of designated control outputs. It is necessary to formally model and analyze the timing behavior of a system. Specifications, models, analyses and code all need to be well-structured, understandable, traceable and amenable to multiple independent means of verification.

There is a need in the art for solutions in modeling real-time periodic and aperiodic task scheduling and message passing useful in integrated mission-critical systems, or in systems with high-rate applications and microcontrollers having constrained throughput and/or memory.

"MetaH support for real-time multi-processor avionics", proceedings of 5th) International workshop on parallel and distributed real-time systems and third workshop on object-oriented real-time systems, 1 to 3 April 1997, pages 11 to 21, Geneva, Switzerland discloses a real time modeller generating a detailed preempted fixed priority model of an application.

The invention addresses deterministic communication between two periodic processes. It includes a communication model, a deadline reduction technique, a period transformation technique and implementation efficiency buffer assignment rules.

In one embodiment, the invention provides a method of generating an assigned scheduling priority of a plurality of tasks in a multitask system, comprising:

defining a first list of the plurality of tasks, wherein the first list of the plurality of tasks is sorted with a task deadline as a primary key and a task criticality as a secondary key;

transforming the task deadline of each of the plurality of tasks one at a time using a transformation scenario, beginning with the task having the least task deadline, thereby producing a transformed task deadline for each of the plurality of tasks;

defining a second list of the plurality of tasks, wherein the second list of the plurality of tasks is sorted with the transformed task deadline as the primary key, further wherein each transformed task deadline of a task having a first task criticality is less than any transformed task deadline of a task having a task criticality less than the first task criticality; and

assigning scheduling priority in an order of the second list of the plurality of tasks, thereby producing the assigned scheduling priority.

Figure 1A is a schematic of a flight control system for use in accordance with arm embodiment of the invention.

Figure 1B is a schematic of a redundant flight control system for use in accordance with an embodiment of the invention.

Figure 1C is a block diagram of a multitask system in accordance with an embodiment of the invention.

Figure 2 is an execution timeline of a task in accordance with an embodiment of the invention.

Figure 3 is a schematic of connection types for message passing in accordance with an embodiment of the invention illustrated with task objects.

Figure 4 is a schematic of a hardware object in accordance with an embodiment of the invention.

Figure 5 is a schematic of end-to-end computations and communications in accordance with an embodiment of the invention.

Figure 6 is a schematic of a task executive in accordance with an embodiment of the invention.

Figure 7 is a schematic illustrating executive buffers in accordance with an embodiment of the invention.

Figure 8 is a process flowchart of a dispatcher task in accordance with an embodiment of the invention.

Figure 9 is a process flowchart of an event handler in accordance with an embodiment of the invention.

Figure 10 is a process flowchart of a service component in accordance with an embodiment of the invention.

Figure 11 is a process flowchart of task list generation in accordance with an embodiment of the invention.

Figure 12 is an illustration of example transformation scenarios for use in accordance with embodiments of the invention.

Figure 13 is a process flowchart of task transformation in accordance with an embodiment of the invention.

Figure 14 is a block diagram of an electronic system in accordance with an embodiment of the invention.

Description of the Embodiments

In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the inventions may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that process or mechanical changes may be made without departing from the scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

Figure 1A is a schematic of a flight control system 100. Flight control task 105 is executed at some periodic rate. Flight control task 105 receives sensor data (S) 115 from sensor 110, computes a function f with sensor data 115 and state data 130 computed in a previous dispatch (Xm))) as inputs, and writes an output (Xm+1))) 120 to an actuator 125. This may be written as Xm+1)) = f(Xm)), S). Sensor data 115 should be transferred substantially without delay to flight control task 105, and flight control task 105 must not start executing until it has received the sensor data 115. This undelayed transfer is represented with a double-headed arrow.

Actuator output 120 computed from sensor data 115 read at time t should be written at exactly t + (DELTA) with minimal jitter, where (DELTA) and the task period are determined and specified by a control engineer based on system requirements. Often, (DELTA) is a deadline that occurs before the next dispatch of the flight control task. The state information (Xm))) 130 computed at the mth) dispatch of the task must be received at the (m+1)th) dispatch of the task. This delayed data flow is represented by the feedback connection from the flight control task to itself. The feedback data from the flight control task to itself can also be transferred with some fixed and invariable delay, e.g., the period of that task. These latter two transfers are termed single sample delay (SSD) connections.

If data is sent from a periodic task A to a periodic task B (possibly having different rates), and if the ith) dispatch of B receives data from the jth) dispatch of A in any schedulable run, it must do so in every schedulable run to satisfy feedback control determinacy requirements. This is true for undelayed as well as SSD connections.

Figure 1B shows a variation of a flight control system 100 having redundancy. Flight control system 100 further includes a primary flight control task 105A, a secondary flight control task 105B and a comparator task 135 to select the output (120A or 120B) used to control the system. The end-to-end deadline (DELTA) between reading the sensor input 115 and writing the actuator output 120 applies to the execution of all three tasks (105A, 105B and 135) and to the intermediate data transfer between the two flight control tasks 105A and 105B and the comparator task 135. The data transfer from the flight control tasks 105A and 105B to the comparator task 135 must be substantially undelayed, and a scheduling precedence constraint exists between the two flight control tasks 105A and 105B and the comparator task 135.

In one embodiment of the invention, the system provides preemptive fixed priority scheduling of periodic and aperiodic tasks and assignments between message buffer variables. Priorities are assigned inversely with period or deadline, so that tasks with shorter periods or deadlines have higher scheduling priorities. If the initial priority assignment is inconsistent with task criticalities then the periods and/or deadlines of high-criticality tasks are transformed, i.e., the tasks are decomposed into smaller pieces that are sequentially dispatched at higher rates. For aperiodic scheduling, the embodiment uses both deferrable server and period enforcement algorithms. In another embodiment, the system provides a real-time slack scheduler.

An exact characterization algorithm extended to provide sensitivity analysis information is utilized for schedulability analysis. The example embodiment has been implemented in a MetaH toolset that automatically generates and analyzes formal schedulability, reliability, and partitioning models of a system; and automatically composes the system, building images for each system processor, using generated scheduling and communication code. The MetaH toolset is developed and distributed by Honeywell, Inc., Minneapolis, Minnesota, USA. Other Computer-Aided Software Engineering (CASE) tools may be used with the various embodiments of the invention.

With reference to Figure 1C, task system 100 is a multitask system having at least two schedulable application tasks 110. The scheduling of application tasks 110 within task system 100, as well as the communications of application tasks 110, is controlled by an executive task 150. Each task 110 in the task system 100 is repeatedly dispatched, either at some fixed rate for periodic tasks or in response to some event, i.e., software-generated, interrupt or other event, for aperiodic tasks. A task 110 resides, or is performed by, only one processor 120.

Figure 2 shows the task execution timeline of a task 110 following each dispatch and the terms defined herein for selected instants and intervals of time. The term "task instance" refers to a specific dispatch of a task 110 and the associated sequence of following activities and scheduling points. Between each dispatch of a task 110 and the following deadline, a task must perform a certain amount of work, receiving a certain amount of compute time from the processor. However, the processor may also spend some time working on other tasks 110 between dispatch and completion, during which intervals a task 110 is said to be preempted by other tasks 110. An important observation to make is that task dispatches, i.e., when a task 110 is placed in a prioritized ready queue, and deadlines, i.e., some system-defined deadline or other constraint for completion of the task, occur at deterministic times for periodic tasks. However, task start time, i.e., when computing of the task begins, and complete times, i.e., when computing of the task is complete, may vary depending on scheduling and compute time requirements.

Tasks 110 are characterized using four primary parameters. The class of as task is either periodic, i.e., regularly scheduled for dispatch, or aperiodic, i.e., dispatched in response to some non-scheduled event. The period of a task is the interval between dispatches of a periodic task, or the minimum interval between event arrivals for an aperiodic task. The compute time of a task is the upper bound on the amount of processor time required for an instance of that task to complete after each dispatch. In practice, the degree of assurance that the actual compute time will not exceed this value varies depending on the task.

The criticality of a task in one embodiment is an integer value used to control scheduling behavior when processors are overloaded, i.e., where some subset of tasks is unschedulable. While such a numerical ranking system is convenient for implementation, other ranking systems may be utilized. The schedulability of a task is affected only by tasks on the same processor having a criticality equal or greater to its own criticality. Lower criticality tasks may exceed their stated compute times, or, for aperiodic tasks, may be dispatched at a higher rate than their stated periods, without causing a higher criticality task to miss a deadline.

In one embodiment, messages are values that are transferred from output buffer variables in sender tasks to input buffer variables in receiver tasks according to a specified set of connections. In the MetaH specification language, each task may have one or more input or output ports that designate buffer variable declarations in the task source code, and connections can be made between compatibly typed ports as illustrated in Figure 3. As depicted in Figure 3, task 1101)) has a single sample delay output buffer 310 and an undelayed input buffer 340. Task 1102)) has a single sample delay input buffer 320 and an undelayed output buffer 330. Tasks 1101)) and 1102)) may have additional or other input and output buffers.

Single sample delay output buffer 310 provides its message value to single sample delay input buffer 320. Undelayed output buffer 330 provides its message value to undelayed input buffer 340.

Incoming messages are placed in the input buffers of a receiver task by the time it starts, and outgoing messages are presumed available in the output buffers of a task when it completes. In the absence of any other constraints on task scheduling in a schedulable system, incoming messages should be available at task dispatch, and outgoing messages may not be available until the task deadline. A task is a sender when sending a message value from its output buffer, and a receiver when receiving a message value at its input buffer.

In the example embodiment, there are two types of message connections. The first is a single sample delay connection. The second is an undelayed message connection.

A single sample delay connection causes the value received by a task instance to be the one available at the most recent sender deadline that preceded, or occurred at the same instant as, the receiver dispatch. In one embodiment, an exception occurs when the sender is an aperiodic task,

such that the message value is obtained at the complete time rather than the deadline of the sender.

Hardware objects are allowed to have ports, e.g., device control registers mapped into memory space. As shown in Figure 4, hardware object 400 may have one or more hardware input ports 410 and one or more hardware output ports 420. Transfers to or from hardware ports occur at the deadline of the sender task or dispatch of the receiver task instance, respectively. As noted above for aperiodic tasks, the transfers to a hardware port from an aperiodic task may occur at the task's complete time. Hardware objects provide message values to tasks, e.g., keyboard entry of data or data from a machine-readable medium, as well as accept message values from tasks, e.g., for display to an end-user or to control industrial equipment. Similar to tasks, a hardware object is a sender when sending a message value from its output port and a receiver when receiving a message value at its input port.

Any task or device that outputs and does not input undelayed messages is termed a source. Any task or device that inputs and does not output undelayed messages is termed a sink. Any task or device that outputs undelayed messages is termed a producer. A source, by definition, is a producer. Any task or device that inputs undelayed messages is termed a consumer. A sink, by definition, is a consumer.

Since deadlines and dispatches occur at deterministic times for periodic tasks, this results in a strictly deterministic data dependence among periodic tasks. That is, if the jth) instance of a task receives data from the ith) instance of another task in any schedulable run of the system, it will do so in all schedulable runs of the system. Figure 5 shows an example of undelayed message passing betweenperiodic tasks, where A has undelayed connections to B and C, and B has an undelayed connection to C. In Figure 5, the 1st) instance of task C receives input from the 1st) instances of tasks A and B, while the 2nd) instance of task C receives input from the 3rd) instance of task A and the 1st) instance of task B. This dependency among periodic tasks with undelayed message passing will repeat in every schedulable run of the task system. The exception allowed in the case of an aperiodic sender is deemed an acceptable loss of determinism because aperiodic dispatch times are themselves non-deterministic in some sense, and this allows a simpler implementation.

An undelayed connection establishes a precedence constraint as well as a data dependency between task instances. The sender is executed to completion, the message is transferred, and then the receiver will be allowed to start. In one embodiment, task system 100 has the following constraints on undelayed message connections in what is termed the pairwise synchronous dispatch model.

1. The set of undelayed message connections and associated tasks must form a directed acyclic graph.

2. Every pair of periodic tasks that communicates by an undelayed connection must have harmonic periods, i.e., the period of one must be an integer multiple of the period of the other. Note that transitivity causes all tasks in an undelayed chain to be harmonic, but not in parallel branches of a tree. Consider, for example, parallel branches of undelayed chains A->>B->>C1)) and A->>B->>C2)), where the periods of A, B, C1)) and C2)) are 5ms, 10ms, 20ms and 30ms, respectively.

3. The sender of an undelayed message is allowed to have a lower criticality than the receiver only if the sender has enforced compute time and minimum event interarrival times.

An undelayed data transfer occurs between two periodic task instances only when they were dispatched at the same time, i.e., pairwise synchronous dispatch. in the pairwise synchronous dispatch model, the sender executes to completion first, and the receiver start is delayed until after the message is transferred. An overall end-to-end chain of computations and undelayed message communications has the deadline of the final receiver task. Referring again to Figure 5, where A has undelayed connections to B and C, and B has an undelayed connection to C, note there is no requirement that senders have a higher dispatch rate than receivers. In the example of Figure 5, C over samples the data received from B.

If either the sender or the receiver task is aperiodic, the ordering constraint and message transfer applies to the next instance of the receiver task that is dispatched at or following the dispatch of the sender task. This allows, for example, aperiodic tasks to pass data and dispatch successor aperiodic tasks to form trees of coordinating task instances.

If an undelayed connection comes from a hardware output port, the message value is transferred at the dispatch of the receiver task. If an undelayed connection goes to a hardware input port, the value is transferred at the completion of the sender task. Note that undelayed connections to hardware ports are not temporally deterministic. Accordingly; they may exhibit jitter due to compute time and scheduling variability.

In one embodiment, executive task 150 schedules tasks using a preemptive fixed priority discipline. Executive task 150 is responsible for managing task priorities, dispatching tasks (placing them on a prioritized ready queue), suspending tasks (removing them from the ready queue), and moving data between task buffer variables. Executive task 150, with reference to Figure 6, includes three components:

1. a periodic dispatcher task 610 that is the highest priority task in the task system 100 and manages periodic dispatches of tasks 110 and their single sample delay communications,

2. an event handler 620 that manages aperiodic dispatches of tasks 110 and their single sample delay communications,

3. a service component 630 that manages task completions and all undelayed communications of tasks 110. These three components may be automatically generated from a MetaH specification of tasks and their message and event connections.

Message passing is implemented by assignments between task buffer variables. In many cases an executive buffer variable may be allocated and used within the executive task 150, e.g., connections between non-harmonic or aperiodic tasks. In general, movement of message data is implemented as an assignment from a sender's buffer variable to an executive buffer variable followed by an assignment from the executive buffer variable to the receiver's buffer variable. For example, in Figure 7, sender task 1101)) passes its message value from an output buffer 710 to a shadow output buffer 720, an executive buffer. Shadow output buffer 720 in turn passes the message value to shadow input buffer 730, another executive buffer. Shadow input buffer 730 passes the message value to an input buffer 740 of receiver task 1102)). The two assignments, i.e., from sender to executive and executive to receiver, may occur at different scheduling points, e.g., the first at the deadline of a sender periodic task 1101)) and the second at the dispatch of a receiver periodic task 1102)). In one embodiment, the intermediate assignment of a message value to an executive buffer variable could be optimized away for connections between harmonic periodic tasks whose deadlines equal their periods, such that sender task 1101)) passes its message value directly to receiver task 1102)), as shown with dashed line 750. In this case, the executive buffers are eliminated. In another embodiment, the shadow output buffer and the shadow input buffer are the same executive buffer, for convenience termed a shadow input buffer.

The dispatcher task 610 performs single sample delay message passing between periodic tasks and performs periodic task dispatching. The dispatcher task 610 is typically implemented as the handler of a periodic hardware clock interrupt that occurs nearly simultaneously on all processors. The interrupt rate should be selected so that every dispatch and deadline is an integer multiple of the interrupt period, e.g., the greatest common divisor of the periods and deadlines that appear in the system specification.

At each interrupt, a cycle counter is incremented by 1 (modulo some large value that is a common multiple of all periods). The periodic actions that are to occur at each interrupt are determined by whether or not the cycle counter is evenly divisible by the pediodicity of an action.

In one embodiment, a process flow of dispatcher task 610 can be described with reference to Figure 8. Figure 8 is a process flowchart having action boxes 810, 820, 840 and 850, as well as decision box 830. In action box 810, dispatcher task 610 is made ready to run at the periodic interrupt, such as a hardware clock interrupt. Upon receiving the periodic interrupt, the cycle counter is incremented in action box 820. Decision box 830 determines if any tasks scheduled are to be dispatched this cycle, i.e., where the cycle evenly divides the quantity of the task period divided by the periodic interrupt. If tasks are to be dispatched in decision box 830, action box 840 determines the set (S) of all tasks to be dispatched. Buffer-to-buffer message assignments are made in action box 850 for those periodic tasks meeting the criteria of decision box 830, and those tasks are dispatched. Control is then returned to the tasks interrupted by the periodic interrupt. Dispatch of

the periodic tasks can be visualized as adding the task to a ready queue 890. With reference to Figure 8, the following example is provided:

The event handler 620 is executed whenever external interrupts or internal software-generated events occur. Message values to be received at the dispatch of aperiodic tasks are assigned to their input buffer variables and the tasks are dispatched.

Figure 9 is a process flowchart of one embodiment of event handler 620. Figure 9 includes actions boxes 910, 920 and 930. In action box 910, event handler 620 is executed in response to a software-generated event or external interrupt. Upon receiving the interrupt in action box 910, event handler 620 assigns message values to their task input buffers in action box 920. The aperiodic task or tasks associated with the interrupt in 910 are dispatched in action box 930. Control is then returned to the highest priority ready task. As with dispatch task 610, dispatching an aperiodic task includes adding the aperiodic task to the ready queue 890.

The service component 630 is executed when a task instance completes. The completing task is removed from the ready queue 890. Output values produced by the completing task are assigned to corresponding executive or receiver task buffer variables according to rules we present below. These assignments are conditional, depending on information recorded at the dispatch of every task that may receive undelayed messages. At each dispatch of a periodic task that may receive undelayed input from another periodic task, the cycle at which that task is dispatched is recorded. At the dispatch of each aperiodic task that may receive undelayed input from another task, the scheduling state of each sender task (awaiting dispatch, or dispatched but not yet completed) is recorded.

Figure 10 is a process flowchart of one embodiment of service component 630. Figure 10 includes actions boxes 1010, 1020 and 1030. In action box 1010, service component 630 is executed when a task completes. Upon completion of a task or tasks resulting in action box 1010, service component 630 removes the completing task or tasks from ready queue 890. Output from the completing task or tasks is assigned to an executive or receiver buffer in action box 1030. Control then goes to the highest priority task in the ready queue. Assignment of output in action box 1030 can be further described with reference to Table 1.

In one embodiment, a priority assignment algorithm assigns a higher priority to the sender of an undelayed message than to any of its downstream receivers. Downstream receivers include any task directly receiving the undelayed message, as well as all receiving tasks in an acyclic graph rooted at the sender of the undelayed message. This guarantees that any task whose buffers are written at the completion of another task, i.e., any task receiving undelayed values from another task, has remained preempted from the time of its dispatch to the time of the assignment and thus does not start until after the assignment.

Whenever possible, a task with high criticality but long period is transformed so that a deadline monotonic priority assignment can be used. In one embodiment, period transformation is a form of controlled time-slicing. The compute time of the transformed task is divided by some integer value to arrive at a time slice for that task. A dispatch of the transformed task is converted into a dispatch followed by a series of periodic resumptions. Each dispatch and resumption grants a time slice and after exhausting each time slice a transformed task is suspended until its next resumption. The overall effect is to make a low rate task look like a high rate task with smaller compute time, and thus higher priority .

For period transformation of periodic tasks , the dispatches and resumptions are simply inserted into the proper cases of the dispatcher case statement (Q1)) is then constrained to be a multiple of all transformed periods). Period transformation of aperiodic tasks depends on the scheduling protocol used. Period transformation can be easily applied using the deferrable server protocol, since this protocol is essentially controlled time-slicing slaved to the dispatcher frequency. In one embodiment, period enforcement is approximated by defining the reenabling of a task as the next dispatcher task dispatch, and an analogous approximate period transformation might also be performed. Task scheduling can also be adapted to take criticality into account.

The MetaH toolset generates data tables and code for the dispatcher task 610, event handler 620 and service component 630. It further generates and analyzes a real-time schedulability model of the task system 100.

The undelayed message connections and tasks are checked to make sure

they contain no cycles. Task deadlines are then reduced as needed so that the deadline of every sender of an undelayed message is strictly less than the deadline of all its receivers. A subsequent deadline-monotonic priority assignment phase, which assigns higher priorities to shorter deadlines, assigns a higher priority to the sender of an undelayed message than to the receiver. This insures that the receiver remains preempted and does not start until after the sender completes whenever the conditions for undelayed transfer are satisfied.

In greater detail, the set of undelayed message connections is first checked for cycles. Task deadlines are then reduced as needed so that the deadline of every sender of an undelayed message is strictly less than the deadline of all its receivers. A subsequent deadline-monotonic priority assignment phase, which assigns higher priorities to shorter deadlines, will assign a higher priority to the sender of an undelayed message than to its receivers. This insures that the receiver remains preempted and does not start until after the sender completes whenever the conditions for undelayed transfer are satisfied.

More formally, the set of all undelayed messages is represented as a reachability matrix R with R(i,j) = 1 if (tau)i)) ->> (tau)j)) and zero otherwise. Construct Rk)(i,j) = 1 if there is an undelayed connection path from (tau)i)) to (tau)j)) of length exactly k, and zero otherwise. Cycles, which are not permitted, exist if for any 1 ≤ i,k ≤ nu)), Rk)(i,j) = 1, where nu)) is the number of tasks with undelayed connections.

Next construct a distance matrix D from the set(Rk)) by D(i,j)-) max (k)Rk)(E,j) = 1). In words, D(i,j) is the maximum length undelayed message connection path from (tau)i)) to (tau)j)). There may be multiple paths, in which case set D(i,j) = 0 (rather than (infinity)). The deadline of each task (tau) is then adjusted to be the minimum of its user-specific deadline and the deadlines of all tasks that can be reached from (tau). To insure distinct deadlines and priority assignments, these deadlines are then decreased by m(epsilon), where m is the maximum connection depth between an undelayed message sender and all of the leafs in the undelayed connection directed acyclic graph (DAG) rooted at that sender, and e is a time quantum preferably several orders of magnitude smaller than the number of tasks times the deadline quantum, i.e., the dispatcher task rate. For example, (epsilon) may be 1 nanosecond with the expectation that deadlines will be multiples of a dispatcher task period measured in milliseconds. The term internal deadlines is defined to refer to these adjusted deadlines. In mathematical notation, Let I(i) = (k : D(i,k) > 0). I(i) is the index set of all tasks that (tau)i)) can reach via an undelayed message chain. Then for each i, (tau)'i))deadline = mink(set membership)I())i))))) ((tau)'i))deadline, (tau)'k))deadline -) D))(i,k) * (epsilon)).

Conflicts can arise between the user-specified criticalities for two tasks and the priority assignments implied by undelayed connections and their corresponding internal deadlines. For example, if there is an undelayed connection from A to B then A must have a higher priority than B to properly implement the precedence constraint, but B could have a higher user-specified criticality than A. A conflict test is given by (tau)'i))criticality > (tau)'j))criticality and j (epsilon) I(i). Such conflicts are allowed provided that compute time limits (and, for aperiodic tasks, period enforcement) are specified for the sender, otherwise it is an error. Internal deadlines (and priorities) are assigned in accordance with undelayed connection precedence constraints rather than in accordance with user-specified criticality attributes when there is such a conflict. User-specified criticality values are adjusted upward as needed to remove acceptable conflicts. The term internal criticalities is defined to refer to these adjusted criticality values.

As an example, let (tau)u)) be a task that sends an undelayed message. Let Ru)) be the set of all tasks that eventually receive input from (tau)u)), directly or through intermediate tasks via a sequence of undelayed messages. Ru)) contains the nodes of the DAG of receiver tasks rooted at (tau)u)), and is easily constructed using a transitive closure of all tasks and their message connections. Since (tau)u)) must complete before any task in Ru)) can begin, the internal criticality of (tau)u)) is adjusted to be the minimum of its user-specified criticality and the internal criticalities of tasks in Ru)).

The list of tasks that send or receive undelayed messages is then sorted by ascending internal deadlines. If multiple tasks have equal deadlines, then that sublist is sorted by ascending criticality. The result is a sorted list with internal deadline as primary key and

internal criticality as secondary key, where internal deadlines and internal criticalities are both consistent with each other and ascending.

The list of remaining tasks (those that neither send nor receive undelayed messages) is now merged with this list in sorted order, using user-specified deadline as the primary key and user-specified criticality as secondary key. Inconsistencies among criticality rankings and deadline rankings is permissible in this list. These inconsistencies will be removed later using period transformation. Internal criticalities and internal deadlines are set to the user-specified criticalities and user-specified deadlines, respectively.

The merged list of tasks is sorted using internal deadline as the primary key and internal criticality as the secondary key. The next step is to transform the periods and deadlines of the tasks so that both criticalities and deadlines are in monotonic order. That is, all tasks having a first criticality have deadlines that are less than any task having a lower criticality.

Figure 11 is a process flowchart of one embodiment of the foregoing task list generation. In Figure 11, the list of tasks that send or receive undelayed messages and the list of remaining tasks are generated in parallel. However, there is no requirement for such parallel implementation.

Figure 11 includes action boxes 1110, 1115, 1120, 1125, 1135, 1140, 1145, 1155, 1160, 1165 and 1170, as well as decision boxes 1130 and 1150. Generation of the list of tasks that send or receive undelayed messages for each processor begins at action box 1110. Internal deadlines are set in action box 1115 such that the deadline of every sender task is strictly less than the deadline of all its receivers. The list is then sorted by internal deadline in action box 1115. Internal criticalities are set in action box 1125 to remove conflicts. Decision box 1130 determines if multiple tasks in the sorted list have equal internal deadlines. If yes, the portion or portions of the list having equal deadlines are sorted by internal criticality in action box 1135. If there are no portions of the list having equal internal deadlines in decision box 1130, or following sorting by internal criticality in action box 1135, control is transferred to action box 1165.

Generation of the list of tasks that do not send nor receive undelayed messages for each processor begins at action box 1140. The list generated in action box 1140 is sorted by user-specified deadline in action box 1145. Decision box 1150 determines if multiple tasks in the sorted list have equal user-specified deadlines. If yes, the portion or portions of the list having equal user-specified deadlines are sorted by user-specified criticality in action box 1155. If there are no portions of the list having equal user-specified deadlines in decision box 1150, or following sorting by user-specified criticality in action box 1155, control is transferred to action box 1160 where internal criticalities and deadlines are set to the user-specified criticalities and deadlines, respectively.

Action box 1165 merges the sorted list of tasks that send or receive undelayed messages with the sorted list of tasks that do not send nor receive undelayed messages. The merged list is sorted with internal **deadline** as the primary key and internal criticality as the secondary key. The merged list is then subjected to transformation in action box 1170 to generate the priority sorted list.

A task is transformed by **dividing** its period and compute time by some positive integer, thus converting it, in this example via controlled run-time time slicing, into a task with smaller period and **deadline** and consequently higher **priority** .

The transformation **algorithm** operates on **tasks** one at a time, starting with the task having least **deadline** . The list of tasks can be viewed as a concatenation of sublists HELpU where p is the task currently being transformed, H is the sublist of tasks having criticality higher than that of p, E is the sublist of tasks having criticality equal to that of p, L is the sublist of tasks having criticality less than that of p, and U is the untransformed portion of the list. The goal is to find an integer divisor of the period (and compute time) of p, i.e., a transform factor, that allows the list to be rewritten as HE1))pE2))LU where the tasks in E1)) and E2)) have criticalities equal to that of p, the tasks in E1)) have no deadlines greater than that of p, and the tasks in E2)) have no deadlines less than that of p.

Several factors complicate the solution to this problem. It is possible to construct examples having no feasible integer solution, where trans

forming p by transform factor i yields a transformed period too large, but transforming p by transform factor i + 1 yields a transformed period too small. For example, consider the criticality ordering A > B > C with the period of A and C equal to 2 but the period of B equal to 3. Using the transform factor of 1 yields a transformed period too large, while using the transform factor of 2 yields a transformed period too small.

A transformed task may need to complete by a preperiod deadline. Thus, transformation of the deadline analogous to the transformation of period may be appropriate.

Transformation introduces context swap overheads. In one embodiment, these context swap overheads are minimized. Furthermore, transformed periods and deadlines are preferably multiples of the clock interrupt period. Finally, the sender of an undelayed message cannot be transformed, as this might create intervals in which the receiver could start before the sender had completed. Accordingly, undelayed message senders have their deadlines calculated prior to any period transformations.

Figure 12 shows three scenarios for transforming a task so that it will receive its stated amount of compute time by its stated deadline. The first portion of Figure 12 shows the original task period and deadline. Scenario 1 of Figure 12 is to transform both the period and the deadline, where the transformed deadline is a preperiod deadline with respect to the transformed period and is selected so that the transformed deadline of the final resume occurs at the original deadline. This scenario is preferred when the transformed deadline is a substantial fraction of the transformed period. Scenario 2 transforms the task so its original deadline is a multiple of the transformed period. The transformed deadline equals the transformed period, and the transformed compute time is such that the task will complete after some number of transformed periods that is no greater than the original deadline. Scenario 2 is preferred over Scenario 1 when Scenario 1 would produce a transformed deadline that is a small fraction of the transformed period. Both scenarios are the same when the original deadline and original period are equal. Scenario 3 is to simply reduce the deadline as needed, i.e., just increase the priority as needed to satisfy the criticality requirement without transforming the scheduling of the task. Scenario 3 is utilized when transforming senders of undelayed messages and in cases where no integer transform factor is feasible.

In one embodiment, a search is performed over the range of feasible integer transform factors, i.e., those that would move task p into the sublist E. For each feasible transform factor, both Scenario 1 and Scenario 2 are evaluated. Scenario 3 may also be evaluated for all integer transform factors from 1 through the largest transform factor that does not put p ahead of E, which has the effect of evaluating combinations of Scenario 3 with Scenarios 1 and 2.

In one embodiment, a cost function is used to select one scenario over another, such that cost is minimized. In another embodiment, the cost function is the utilization required for context swaps, i.e., removal and replacement of the stack and registers, plus a factor that empirically accounts for the decrease in schedulability due to preperiod deadlines. In a further embodiment, the cost function is the transform factor (which may be 1) times: where S is the context swap time, Tt)) is the transformed period, and Dt)) is the transformed deadline. In one embodiment, selection of a scenario is made to minimize the cost function.

Figure 13 is a process flowchart of one embodiment of task transformation, performed for each task in the merged list of tasks. In action box 1310, feasible integer transform factors are determined. Feasible transform factors include the lowest integer divisor of the period of p that allows the sublist HELpU to be rewritten as HE1))pE2))LU where the tasks in E1)) and E2)) have criticalities equal to that of p, the tasks in E1)) have no deadlines greater than that of p, and the tasks in E2)) have no deadlines less than that of p, i.e., minimum feasible transform factor or TFmin)), the largest integer divisor of the period of p that allows the sublist HELpU to be rewritten as HE1))pE2))LU where the tasks in E1)) and E2)) have criticalities equal to that of p, the tasks in E1)) have no deadlines greater than that of p, and the tasks in E2)) have no deadlines less than that of p, i.e., maximum feasible transform factor or TFmax)). In action box 1320, the task has its period and deadline transformed in a first scenario for each transform factor from

TFmin)) to TFmax)), where the transformed deadline is a preperiod deadline with respect to the transformed period and is selected so that the transformed deadline of the final resume occurs at the original deadline. In action box 1330, the task is transformed in a second scenario for each transform factor from TFmin)) to TFmax)) such that its original deadline is a multiple of the transformed period. The transformed deadline equals the transformed period, and the transformed compute time is such that the task will complete after some number of transformed periods that is no greater than the original deadline. In action box 1340, the deadline of the task is transformed in a third scenario, reducing the deadline to increase the priority as needed to satisfy the criticality requirement without transforming the scheduling of the task. After all scenarios are evaluated over their respective range of transform factors, cost is evaluated in action box 1350 for each transform factor of each scenario. In action box 1360, the scenario and transform factor having the lowest cost value is selected to transform the task. The task is transformed in action box 1370.

After all tasks have been transformed, priorities are assigned in the order in which tasks appear in the final list. The ordered priorities of the transformed tasks represents an assigned scheduling priority. The assigned scheduling priority is utilized by the executive for ordered execution of the tasks on a processor within the multitask system.

As one example, in an implementation of the invention using the MetaH toolset, the MetaH toolset generates a linear schedulability model, one in which each task may be described as a sequence of task components. Each task component may be shared by other tasks and may block other tasks. In general, actions that are performed by the executive task 150 on behalf of a particular task 110, such as message passing, are modeled as components of that task and blocking times for other tasks of higher priority. Compute times for generated executive components are produced by the MetaH tool using attributes of the target hardware, e.g., buffer assignment times are estimated by the linear function A1)) + A2)) * b, where b is the number of bytes being assigned and A1)), A2)) are intercept and slope attributes defined in the MetaH processor or bus specification. The mapping between specification, implementation, and model is thus more detailed than a simple list of tasks and their parameters. Analysis is performed using an extension of an exact characterization algorithm that allows tasks to be decomposed into components and provides compute-time sensitivity analysis information.

The various embodiments of the invention will not always produce a user-specified deadline monotonic priority assignment. Many schedulability analysis methods well known to those skilled in the art work with any priority assignment without assumptions or special constraints on the relationship between priorities and deadlines, periods, or minimum interarrival rates and can be used with the approach of the embodiments.

The solution of the various embodiments remains valid for tasks that use real-time semaphores, providing the semaphore protocol does not allow the processor to execute at a priority lower than any task that is awaiting a semaphore. This condition is necessary to insure that preempted receivers of undelayed messages cannot start when a sender blocks on a semaphore. This is true of the ceiling priority and all the priority inheritance semaphore protocols.

The various embodiments of the invention further support dynamic reconfiguration, or mode changes. In one embodiment, mode changes are restricted to hyperperiod boundaries. Transition modes are introduced for each user-specified mode change, and the dispatcher may perform process starts and stops and slightly different patterns of message passing in a transition mode. MetaH hierarchical mode specifications makes it possible for modes to share subsets of tasks and connections in complex ways. The algorithms thus presented are performed for the union of all modes in a system, followed by a post-processing phase to reduce the number of priority levells required.

Selecting clock interrupt rates may be an issue in distributed real-time systems. Temporally deterministic message release times may be needed to assure hard end-to-end deadlines. Clock interrupt periods may be desired that not only divide the user-specified periods and deadlines, but also provide convenient transformed periods and convenient network message release times.

The various methods of the invention provide a model adapted to analyze the timing behavior of a task system, and in particular, modular mission-critical software systems, high-rate applications and

microcontrollers. Use of such models permits offline analysis and configuration to tailor an executive for each system, rather than relying on a generic executive, which allows a simpler, smaller and faster executive. Such models further assist the formulation of well-structured specifications for task systems, which may permit the creation of more structured and traceable code underlying the task system.

While the example embodiments describe multiprocessor task systems communicating on a single bus, the invention is not limited to single-bus systems. While it is preferred that multiple processors be connected by relatively high-speed, low-latency busses for efficient transfer of single sample delay messages, distributed systems may be utilized where scheduling approaches allow for a single sample delay message to be released with a specified deadline on the network, and where communication take place concurrently with processor execution.

Models produced using various embodiments of the invention can be used to define electronic systems to carry out the scheduling and message passing activities of the multitask systems. The electronic systems described make use of a variety of electronic equipment having processors utilizing instructions in machine-readable form to carry out the methods described herein. Figure 14 depicts a block diagram of a processor 1410 coupled to a machine-readable medium 1420. Processor 1410 may be further coupled to bus 1430 for communication to other processors. Machine-readable medium 1420 may include fixed devices coupled to processor 1410, such as internal magnetic medium or programmable memory device. Machine-readable medium 1420 may further include removable devices coupled to processor 1410, such as removable magnetic medium or programming cartridge. Machine-readable medium 1420 contains instructions stored thereon, in machine-readable format, capable of causing processor 1410 to carry out the methods described herein.

Conclusion

Methods are disclosed useful in modeling real-time periodic and aperiodic task scheduling and message passing within multitask systems. Models produced using methods of the invention are adapted to analyze the timing behavior within such multitask systems. The methods utilize undelayed and single sample delayed message connections among software task objects and hardware objects. Task priorities are assigned inversely with period or deadline, so that tasks with shorter periods or deadlines have higher scheduling priorities. Periods of high-criticality tasks are decomposed into smaller pieces that are sequentially dispatched at higher rates where the initial assignment of priority is inconsistent with task criticality. System models define electronic systems and instructions for carrying out the scheduling and message passing of the multitask system.

Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiments shown. Many adaptations of the invention will be apparent to those of ordinary skill in the art Accordingly, this application is intended to cover any adaptations or variations of the invention. It is manifestly intended that this invention be limited only by the following claims and equivalents thereof.

CLAIMS EP 1244963 B1

1. A method of generating an assigned scheduling priority of a plurality of tasks (110) in a multitask system (100), comprising:
   defining a first list of the plurality of tasks, wherein the first list of the plurality of tasks is sorted with a task deadline as a primary key and a task criticality as a secondary key;
   transforming the task deadline of each of the plurality of tasks one at a time using a transformation scenario, beginning with the task having the least task deadline, thereby producing a transformed task deadline for each of the plurality of tasks;
   defining a second list of the plurality of tasks, wherein the second list of the plurality of tasks is sorted with the transformed task deadline as the primary key, further wherein each transformed task deadline of a task having a first task criticality is less than any transformed task deadline of a task having a task criticality less than the first task criticality; and
   assigning scheduling priority in an order of the second list of the plurality of tasks, thereby producing the assigned scheduling priority.

2. The method of claim 1, wherein the transformed task deadline of at least one of the plurality of tasks (110) equals the task deadline of that at least one of the plurality of tasks.
3. The method of claim 1, wherein the transformation scenario is selected from the group consisting of:
transforming both a task period and the task deadline of a task (110) dividing the task period by a transformation factor, thereby producing the transformed task deadline and a transformed task period, wherein the transformed task deadline is a preperiod deadline with respect to the transformed task period, and wherein the transformed task deadline of a final resume of the task occurs at the original task deadline;
transforming both the task period and the task deadline of the task by dividing the task period by a transformation factor, thereby producing the transformed task deadline and the transformed task period, wherein the original task deadline of the task is a multiple of the transformed period of the task and wherein the transformed task deadline equals the transformed task period; and
transforming the task deadline of the task by dividing the task deadline by a transformation factor, thereby producing the transformed task deadline, wherein the transformed task deadline of the task is less than any transformed task deadline of other previously-transformed tasks having lower task criticality.
4. The method of claim 3, wherein the transformation scenario is evaluated at a plurality of transformation factors.
5. The method of claim 3, wherein transforming the task deadline further comprises evaluating a cost function to select the transformation scenario.
6. The method of claim 5, wherein the cost function is the transformation factor times the quantity: where:
S is a context swap time
Tt)) is the transformed task period
Dt)) is the transformed task deadline.
7. The method of claim 1, wherein transforming the task deadline further comprises evaluating a cost function to select the transformation scenario from a plurality of possible transformation scenarios.
8. The method of claim 1, wherein transforming the task deadline further comprises evaluating the transformation scenario using at least two transformation factors and evaluating a cost function to select one of the at least two transformation factors for the transformation scenario.
9. The method of claim 1, wherein defining a first list of the plurality of tasks further comprises:
defining a first sublist of at least one task (112) of the plurality of tasks (110) involved in sending or relying on undelayed messages, wherein the first sublist is sorted with an internal task deadline as a primary key and an internal task criticality as a secondary key;
defining a second sublist of remaining tasks of the plurality of tasks, wherein the second sublist is sorted with a user-specified task deadline as a primary key and a user-specified task criticality as a secondary key, and
merging the first sublist and the second sublist, thereby producing the first list of the plurality of tasks.
10. The method of claim 1, wherein the multitask system is a flight control system.
11. A machine-readable medium (1420) having instruction stored thereon capable of causing a processor (1410) to carry out a method, the method comprising defining a first list of a plurality of tasks, wherein the first list of the plurality of tasks is sorted with a task deadline as a primary key and a task criticality as a secondary key;

transforming the task deadline of each of the plurality of tasks one at a time using a transformation scenario, beginning with the task having the least task deadline, thereby producing a transformed task deadline for each of the plurality of tasks;

defining a second list of the plurality of tasks, wherein the second list of the plurality of tasks is sorted with the transformed task deadline as the primary key, further wherein each transformed task deadline of a task having a first task criticality is less than any transformed task deadline of a task having a task criticality

less than the first task criticality; and

assigning scheduling priority in an order of the second list of the plurality of tasks, thereby producing an assigned scheduling priority.

12. A machine-readable medium (1420) according to claim 11, wherein the transformation scenario is selected from the group consisting of:

transforming both a task period and the task deadline of a task by dividing the task period by a transformation factor, thereby producing the transformed task deadline and a transformed task period, wherein the transformed task deadline is a preperiod deadline with respect to the transformed task period, and wherein the transformed task deadline of a final resume of the task occurs at the original task deadline;

transforming both the task period and the task deadline of the task by dividing the task period by a transformation factor, thereby producing the transformed task deadline and the transformed task period, wherein the original task deadline of the task is a multiple of the transformed period of the task and wherein the transformed task deadline equals the transformed task period; and

transforming the task deadline of the task by dividing the task deadline by a transformation factor, thereby producing the transformed task deadline, wherein the transformed task deadline of the task is less than any transformed task deadline of other previously-transformed tasks having lower task criticality.

CLAIMS EP 1244963 B1

1. Verfahren zum Erzeugen einer zugewiesenen Einteilungsprioritat mehrerer Tasks (110) in einem Multitask-System (100), mit den folgenden Schritten:

Definieren einer ersten Liste der mehreren Tasks, wobei die erste Liste der mehreren Tasks mit einer Task-Frist als ein Primarschlussel und einer Task-Kritizitat als ein Sekundarschlussel sortiert wird;

Transformieren der Task-Frist jeder der mehreren Tasks einzeln unter Verwendung eines Transformationsszenarios, beginnend mit der Task mit der kleinsten Task-Frist, wodurch eine transformierte Task-Frist fur jede der mehreren Tasks erzeugt wird;

Definieren einer zweiten Liste der mehreren Tasks, wobei die zweite Liste der mehreren Tasks mit der transformierten Task-Frist als Primarschlussel sortiert wird und wobei weiterhin jede transformierte Task-Frist einer Task mit einer ersten Task-Kritizitat kleiner als jede transformierte Task-Frist einer Task mit einer kleineren Task-Kritizitat als die erste Task-Kritizitat ist; und

Zuweisen von Einteilungsprioritat in einer Reihenfolge der zweiten Liste der mehreren Tasks, wodurch die zugewiesene Einteilungsprioritat erzeugt wird.

2. Verfahren nach Anspruch 1, wobei die transformierte Task-Frist mindestens einer der mehreren Tasks (110) gleich der Task-Frist dieser mindestens einen der mehreren Tasks ist.

3. Verfahren nach Anspruch 1, wobei das Transformationsszenario aus der folgenden Gruppe ausgewahlt wird:

Transformieren sowohl eines Task-Zeitraums als auch der Task-Frist einer Task (110), wobei der Task-Zeitraum durch einen Transformationsfaktor dividiert wird, wodurch die transformierte Task-Frist und ein transformierter Task-Zeitraum erzeugt werden, wobei die transformierte Task-Frist in bezug auf den transformierten Task-Zeitraum eine Vorzeitraumfrist ist und wobei die transformierte Task-Frist einer letzten Wiederaufnahme der Task an der ursprunglichen Task-Frist auftritt;

Transformieren sowohl des Task-Zeitraums als auch der Task-Frist der Task durch Dividieren des Task-Zeitraums durch einen Transformationsfaktor, wodurch die transformierte Task-Frist und der transformierte Task-Zeitraum erzeugt werden, wobei die ursprungliche Task-Frist der Task ein Vielfaches des transformierten Zeitraums der Task ist und wobei die transformierte Task-Frist gleich dem transformierten Task-Zeitraum ist; und

Transformieren der Task-Frist der Task durch Dividieren der Task-Frist durch einen Transformationsfaktor, wodurch die transformierte Task-Frist erzeugt wird, wobei die transformierte Task-Frist der Task kleiner als jede transformierte Task-Frist anderer, zuvor transformierter Tasks mit niedrigerer Task-Kritizitat ist.

4. Verfahren nach Anspruch 3, wobei das Transformationsszenario bei mehreren Transformationsfaktoren ausgewertet wird.

5. Verfahren nach Anspruch 3, wobei das Transformieren der Task-Frist weiterhin das Auswerten einer Kostenfunktion zur Auswahl des Transformationsszenarios umfast.
6. Verfahren nach Anspruch 5, wobei die Kostenfunktion der Transformationsfaktor ist, multipliziert mit der folgenden Grose: wobei S eine Kontextumwechselzeit, Tt)) der transformierte Task-Zeitraum und Dt)) die transformierte Task-Frist ist.
7. Verfahren nach Anspruch 1, wobei das Transformieren der Task-Frist weiterhin das Auswerten einer Kostenfunktion zur Auswahl des Transformationsszenarios aus mehreren moglichen Transformationsszenarien umfast.
8. Verfahren nach Anspruch 1, wobei das Transformieren der Task-Frist weiterhin das Auswerten des Transformationsszenarios unter Verwendung von mindestens zwei Transformationsfaktoren und das Auswerten einer Kostenfunktion zur Auswahl eines der mindestens zwei Transformationsfaktoren fur das Transformationsszenario umfast.
9. Verfahren nach Anspruch 1, wobei das Definieren einer ersten Liste der mehreren Tasks weiterhin folgendes umfast:

Definieren einer ersten Subliste mindestens einer Task (112) der mehreren Tasks (110), die an dem Senden von unverzogerten Nachrichten oder dem sich Verlassen auf solche beteiligt sind, wobei die erste Subliste mit einer internen Task-Frist als ein Primarschlussel und einer internen Task-Kritizitat als ein Sekundarschlussel sortiert wird;

Definieren einer zweiten Subliste verbleibender Tasks der mehreren Tasks, wobei die zweite Subliste mit einer benutzerspezifizierten Task-Frist als ein Primarschlussel und einer benutzerspezifizierten Task-Kritizitat als ein Sekundarschlussel sortiert wird, und

Zusammenfuhren der ersten Subliste und der zweiten Subliste, wodurch die erste Liste der mehreren Tasks erzeugt wird.

10. Verfahren nach Anspruch 1, wobei das Multitask-System ein Flugsteuersystem ist.
11. Maschinenlesbares Medium (1420), auf dem eine Anweisung gespeichert ist, die bewirken kann, das ein Prozessor (1410) ein Verfahren ausfuhrt, wobei das Verfahren die folgenden Schritte umfast:

Definieren einer ersten Liste mehrerer Tasks, wobei die erste Liste der mehreren Tasks mit einer Task-Frist als ein Primarschlussel und einer Task-Kritizitat als ein Sekundarschlussel sortiert wird;

Transformieren der Task-Frist jeder der mehreren Tasks einzeln unter Verwendung eines Transformationsszenarios, beginnend mit der Task mit der kleinsten Task-Frist, wodurch eine transformierte Task-Frist fur jede der mehreren Tasks erzeugt wird;

Definieren einer zweiten Liste der mehreren Tasks, wobei die zweite Liste der mehreren Tasks mit der transformierten Task-Frist als Primarschlussel sortiert wird und wobei weiterhin jede transformierte Task-Frist einer Task mit einer ersten Task-Kritizitat kleiner als jede transformierte Task-Frist einer Task mit einer kleineren Task-Kritizitat als die erste Task-Kritizitat ist; und

Zuweisen von Einteilungsprioritat in einer Reihenfolge der zweiten Liste der mehreren Tasks, wodurch eine zugewiesene Einteilungsprioritat erzeugt wird.

12. Maschinenlesbares Medium (1420) nach Anspruch 11, wobei das Transformationsszenario aus der folgenden Gruppe ausgewahlt wird:

Transformieren sowohl eines Task-Zeitraums als auch der Task-Frist einer Task durch Dividieren des Task-Zeitraums durch einen Transformationsfaktor, wodurch die transformierte Task-Frist und ein transformierter Task-Zeitraum erzeugt werden, wobei die transformierte Task-Frist in bezug auf den transformierten Task-Zeitraum eine Vorzeitraumfrist ist und wobei die transformierte Task-Frist einer letzten Wiederaufnahme der Task an der ursprunglichen Task-Frist auftritt;

Transformieren sowohl des Task-Zeitraums als auch der Task-Frist der Task durch Dividieren des Task-Zeitraums durch einen Transformationsfaktor, wodurch die transformierte Task-Frist und der transformierte Task-Zeitraum erzeugt werden, wobei die ursprungliche Task-Frist der Task ein Vielfaches des transformierten Zeitraums der Task ist und wobei die transformierte Task-Frist gleich dem transformierten Task-Zeitraum ist; und

Transformieren der Task-Frist der Task durch Dividieren der Task-Frist durch einen Transformationsfaktor, wodurch die transformierte Task-Frist erzeugt wird, wobei die transformierte Task-Frist der Task kleiner als jede transformierte Task-Frist anderer, zuvor

transformierter Tasks mit niedrigerer Task-Kritizitat ist.
CLAIMS EP 1244963 B1
1. Procede de generation d'une priorite d'ordonnancement assignee d'une pluralite de taches (110) dans un systeme multitache (100), comprenant :
la definition d'une premiere liste de la pluralite de taches, la premiere liste de la pluralite de taches etant triee en fonction d'un delai prescrit de tache en tant que cle primaire, et d'une criticite de tache en tant que cle secondaire ;
la transformation du delai prescrit de tache de chacune parmi la pluralite de taches, une a la fois, en utilisant un scenario de transformation, en commencant par la tache presentant le moins grand delai prescrit de tache ; pour produire ainsi un delai prescrit de tache transforme pour chacune parmi la pluralite de taches ;
la definition d'une deuxieme liste de la pluralite de taches, la deuxieme liste de la pluralite de taches etant triee en fonction du delai prescrit de tache transforme en tant que cle primaire, chaque delai prescrit de tache transforme d'une tache presentant une premiere criticite de tache etant en outre moins grand qu'un quelconque delai prescrit de tache transforme d'une tache presentant une criticite de tache moins grande que la premiere criticite de tache ; et
l'assignation d'une priorite d'ordonnancement suivant un ordre de la deuxieme liste de la pluralite de taches, en produisant ainsi la priorite d'ordonnancement assignee.
2. Procede selon la revendication 1, dans lequel le delai prescrit de tache transforme d'au moins une parmi la pluralite de taches (110) correspond au delai prescrit de tache de ladite au moins une parmi la pluralite de taches.
3. Procede selon la revendication 1, dans lequel le scenario de transformation est choisi parmi le groupe comprenant :
la transformation a la fois d'une periode de tache et du delai prescrit de tache d'une tache (110) en divisant la periode de tache par un facteur de transformation, pour produire ainsi le delai prescrit de tache transforme et une periode de tache transformee, le delai prescrit de tache transforme etant un delai prescrit pre-periode vis-a-vis de la periode de tache transformee, et
le delai prescrit de tache transforme d'une reprise finale de la tache correspondant au delai prescrit de tache initial ;
la transformation a la fois de la periode de tache et du delai prescrit de tache de la tache en divisant la periode de tache par un facteur de transformation, pour produire ainsi le delai prescrit de tache transforme et la periode de tache transformee, le delai prescrit de tache initial de la tache etant un multiple de la periode transformee de la tache et le delai prescrit de tache transforme correspondant a la periode de tache transformee ; et
la transformation du delai prescrit de tache de la tache en divisant le delai prescrit de tache par un facteur de transformation, pour produire ainsi le delai prescrit de tache transforme, le delai prescrit de tache transforme de la tache etant moins grand qu'un quelconque delai prescrit de tache transforme des autres taches precedemment transformees presentant une moins grande criticite de tache.
4. Procede selon la revendication 3, dans lequel le scenario de transformation est evalue pour une pluralite de facteurs de transformation.
5. Procede selon la revendication 3, dans lequel la transformation du delai prescrit de tache comprend en outre l'evaluation d'une fonction de cout en vue de selectionner le scenario de transformation.
6. Procede selon la revendication 5, dans lequel la fonction de cout est le facteur de transformation multiplie par la quantite : ou :
S est un temps de permutation contextuel
Tt)) est la periode de tache transformee
Dt)) est le delai prescrit de tache transforme.
7. Procede selon la revendication 1, dans lequel la transformation du delai prescrit de tache comprend en outre l'evaluation d'une fonction de cout en vue de selectionner le scenario de transformation parmi une pluralite de scenarii de transformation possibles.
8. Procede selon la revendication 1, dans lequel la transformation du delai prescrit de tache comprend en outre l'evaluation du scenario de transformation en utilisant au moins deux facteurs de transformation et l'evaluation d'une fonction de cout en vue de selectionner un

parmi lesdits au moins deux facteurs de transformation pour le scenario de transformation.

9. Procede selon la revendication 1, dans lequel la definition d'une premiere liste de la pluralite de taches comprend en outre :
la definition d'une premiere sous-liste d'au moins une tache (112) de la pluralite de taches (110) intervenant dans l'envoi ou dependant de messages non retardes, la premiere sous-liste etant triee en fonction d'un delai prescrit de tache interne en tant que cle primaire et d'une criticite de tache interne en tant que cle secondaire ;
la definition d'une deuxieme sous-liste des taches restantes de la pluralite de taches, la deuxieme sous-liste etant triee en fonction d'un delai prescrit de tache precise par l'utilisateur en tant que cle primaire et d'une criticite de tache precisee par l'utilisateur en tant que cle secondaire, et
la fusion de la premiere sous-liste et de la deuxieme sous-liste pour produire ainsi la premiere liste de la pluralite de taches.

10. Procede selon la revendication 1, dans lequel le systeme multitache est un systeme de commande de vol.

11. Support (1420) lisible par machine sur lequel est memorisee une instruction capable d'amener un processeur (1410) a mettre en oeuvre un procede, le procede comprenant la definition d'une premiere liste d'une pluralite de taches, la premiere liste de la pluralite de taches etant triee en fonction d'un delai prescrit de tache en tant que cle primaire, et d'une criticite de tache en tant que cle secondaire ;

la transformation du delai prescrit de tache de chacune parmi la pluralite de taches, une a la fois, en utilisant un scenario de transformation, en commencant par la tache presentant le moins grand delai prescrit de tache, pour produire ainsi un delai prescrit de tache transforme pour chacune parmi la pluralite de taches ;

la definition d'une deuxieme liste de la pluralite de taches, la deuxieme liste de la pluralite de taches etant triee en fonction du delai prescrit de tache transforme en tant que cle primaire, chaque delai prescrit de tache transforme d'une tache presentant une premiere criticite de tache etant en outre moins grand qu'un quelconque delai prescrit de tache transforme d'une tache presentant une criticite de tache moins grande que la premiere criticite de tache ; et

l'assignation d'une priorite d'ordonnancement suivant un ordre de la deuxieme liste de la pluralite de taches, en produisant ainsi une priorite d'ordonnancement assignee.

12. Support (1420) lisible par machine selon la revendication 11, dans lequel le scenario de transformation est choisi parmi le groupe comprenant :
la transformation a la fois d'une periode de tache et du delai prescrit de tache d'une tache en divisant la periode de tache par un facteur de transformation, pour produire ainsi le delai prescrit de tache transforme et une periode de tache transformee, le delai prescrit de tache transforme etant un delai prescrit pre-periode vis-a-vis de la periode de tache transformee, et
le delai prescrit de tache transforme d'une reprise finale de la tache correspondant au delai prescrit de tache initial ;
la transformation a la fois de la periode de tache et du delai prescrit de tache de la tache en divisant la periode de tache par un facteur de transformation, pour produire ainsi le delai prescrit de tache transforme et la periode de tache transformee, le delai prescrit de tache initial de la tache etant un multiple de la periode transformee de la tache et le delai prescrit de tache transforme correspondant a la periode de tache transformee ; et
la transformation du delai prescrit de tache en divisant le delai prescrit de tache par un facteur de transformation, pour produire ainsi le delai prescrit de tache transforme, le delai prescrit de tache transforme de la tache etant moins grand qu'un quelconque delai prescrit de tache transforme des autres taches precedemment transformees presentant une moins grande criticite de tache.

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Set     Items     Description
S1      1138982   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
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              IES OR ACTION? ? OR EVENT? ?
S2     111034   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
               WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
              ING OR SORT??? OR ORDER???)
S3       3176   DEADLINE OR DUE()DATE
S4         50   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
              EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5       4538   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      13203   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
               OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
              OR DERIV???)
S7     615654   DIVID??? OR DIVISION OR MOD
S8       7322   TMAX OR T()MAX
S9       2916   S2(5N)MEASUR???
S10         3   S4(100N)(S5:S6 OR S9)
S11        45   (S5:S6 OR S9)(50N)S3
S12         1   (S5:S6 OR S9)(50N)S3(50N)S8
S13        44   S10:S11 NOT S12
S14        26   S13 AND PY=1978:2003
S15        26   S13 AND (AC=US OR AC=US/PR) AND AY=1978:2003
S16        33   S14:S15
S17        33   IDPAT (sorted in duplicate/non-duplicate order)
S18         6   (S5:S6 OR S9)(50N)S3(50N)S7
? show files;ds
File 348:EUROPEAN PATENTS 1978-2007/ 200738
         (c) 2007 European Patent Office
File 349:PCT FULLTEXT 1979-2007/UB=20070927UT=20070920
         (c) 2007 WIPO/Thomson

```


```
Set     Items   Description
S1    1138982   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
              IES OR ACTION? ? OR EVENT? ?
S2     111034   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
               WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
              ING OR SORT??? OR ORDER???)
S3       3176   DEADLINE OR DUE()DATE
S4         50   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
              EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5       4538   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      13203   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
               OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
              OR DERIV???)
S7     615654   DIVID??? OR DIVISION OR MOD
S8       7322   TMAX OR T()MAX
S9       2916   S2(5N)MEASUR???
S10         3   S4(100N)(S5:S6 OR S9)
S11        45   (S5:S6 OR S9)(50N)S3
S12         1   (S5:S6 OR S9)(50N)S3(50N)S8
S13        44   S10:S11 NOT S12
S14        26   S13 AND PY=1978:2003
S15        26   S13 AND (AC=US OR AC=US/PR) AND AY=1978:2003
S16        33   S14:S15
S17        33   IDPAT (sorted in duplicate/non-duplicate order)
S18         6   (S5:S6 OR S9)(50N)S3(50N)S7
```


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? b 8,35,65,2,94,6,144,434,34,99,266,95,56,60,239
>>>           94 does not exist
>>>1 of the specified files is not available
       01oct07 14:10:32 User263760 Session D4960.3
            $36.62    6.756 DialUnits File348
               $32.30  19 Type(s) in Format  3
                $7.50   1 Type(s) in Format  9
                $4.25  17 Type(s) in Format  6 (UDF)
            $44.05  37 Types
     $80.67  Estimated cost File348
            $28.56    6.013 DialUnits File349
               $30.40  19 Type(s) in Format  3
                $4.00  16 Type(s) in Format  6 (UDF)
            $34.40  35 Types
     $62.96  Estimated cost File349
             OneSearch, 2 files, 12.769 DialUnits FileOS
      $3.46  TELNET
    $147.09  Estimated cost this search
```

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   $400.48  Estimated total session cost  26.296 DialUnits


SYSTEM:OS  - DIALOG OneSearch
  File   8:Ei Compendex(R) 1884-2007/Sep W4
         (c) 2007 Elsevier Eng.  Info. Inc.
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         (c) 2007 ProQuest Info&Learning
  File  65:Inside Conferences 1993-2007/Sep 28
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  File   2:INSPEC 1898-2007/Sep W4
         (c) 2007 Institution of Electrical Engineers
  File   6:NTIS 1964-2007/Oct W2
         (c) 2007 NTIS, Intl Cpyrght All Rights Res
exs ken
Processing
Processed  10 of  14 files ...
Completed processing all files
          785640  TASK? ?
           82237  TRANSACTION? ?
          255495  JOB? ?
         3264427  ACTIVITY
          868555  ACTIVITIES
         1492678  ACTION? ?
         1048263  EVENT? ?
      S1 6893654  TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR
                  ACTIVITIES OR ACTION? ? OR EVENT? ?
Processing
Processed  10 of  14 files ...
Processing
Completed processing all files
         6893654  S1
          115084  PRIORITY
           55004  PRIORITIES
          996131  IMPORTANCE
         2990600  IMPORTANT
         1662651  WEIGH???
          525975  SCOR???
          524807  GRADE? ?
           51438  GRADING
         4848905  RATE? ?
          119967  RATING
          231607  SORT???
         4820731  ORDER???
      S2  299003  S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT
                  OR WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ?
                  OR RATING OR SORT??? OR ORDER???)
           13217  DEADLINE
         3483588  DUE
          348219  DATE
            5178  DUE(W)DATE
      S3   18281  DEADLINE OR DUE()DATE
          223322  MAX
         1708626  MAXIMUM
          426450  ABSOLUTE
         1072874  FINAL
            7656  FINALE
          640407  LAST
         2143669  EFFECTIVE
          142049  FIRM
           64457  DEFINITIVE
           18281  S3
      S4     207  (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR
                  EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
          299003  S2
          807003  FORMULA??
         2653833  ALGORITHM? ?
         2121760  PROCEDURE? ?
      S5   11299  S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
Processing
Processing
Processed  10 of  14 files ...
```

```
Completed processing all files
           299003  S2
          7644489  DETERMIN??????
          4106814  CALCULAT????
          1570283  FIND???
           230793  COMPUTE
            41478  COMPUTES
           618220  COMPUTED
          1159769  COMPUTING
          9217196  MEASUR?
          2199185  DEFIN???
          3183657  DERIV???
      S6    25991  S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR
                   COMPUTE OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR?
                   OR DEFIN??? OR DERIV???)
           519182  DIVID???
           421942  DIVISION
            70652  MOD
      S7   990498  DIVID??? OR DIVISION OR MOD
             1146  TMAX
          3218646  T
           223322  MAX
             6392  T(W)MAX
      S8     7438  TMAX OR T()MAX
KWIC is set to 30.
? ds

Set     Items   Description
S1    6893654   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2     299003   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3      18281   DEADLINE OR DUE()DATE
S4        207   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5      11299   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      25991   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     990498   DIVID??? OR DIVISION OR MOD
S8       7438   TMAX OR T()MAX
? s s4 and s5:S6
              207  S4
            35909  S5:S6
      S9       11  S4 AND S5:S6
? rd
     S10        7  RD  (unique items)
? s s2 and s4
           299003  S2
              207  S4
     S11       28  S2 AND S4
? rd
     S12       18  RD  (unique items)
? s s10 or s12
                7  S10
               18  S12
     S13       18  S10 OR S12
? ds

Set     Items   Description
S1    6893654   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2     299003   S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3      18281   DEADLINE OR DUE()DATE
S4        207   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5      11299   S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      25991   S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
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             OR DERIV???)
S7      990498   DIVID??? OR DIVISION OR MOD
S8        7438   TMAX OR T()MAX
S9          11   S4 AND S5:S6
S10          7   RD  (unique items)
S11         28   S2 AND S4
S12         18   RD  (unique items)
S13         18   S10 OR S12
? s s3 and s5:s6
           18281  S3
           35909  S5:S6
    S14      687  S3 AND S5:S6
? s s14 and s7:s8
             687  S14
          997787  S7:S8
    S15        9  S14 AND S7:S8
? rd
    S16        5  RD  (unique items)
? s s13 or s16
              18  S13
               5  S16
    S17       23  S13 OR S16
? ds

Set     Items   Description
S1    6893654   TASK? ? OR TRANSACTION? ? OR JOB? ? OR ACTIVITY OR ACTIVIT-
             IES OR ACTION? ? OR EVENT? ?
S2     299003    S1(5N)(PRIORITY OR PRIORITIES OR IMPORTANCE OR IMPORTANT OR
              WEIGH??? OR SCOR??? OR GRADE? ? OR GRADING OR RATE? ? OR RAT-
             ING OR SORT??? OR ORDER???)
S3      18281   DEADLINE OR DUE()DATE
S4        207   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
             EFFECTIVE OR FIRM OR DEFINITIVE)(2W)S3
S5      11299    S2(20N)(FORMULA?? OR ALGORITHM? ? OR PROCEDURE? ?)
S6      25991    S2(5N)(DETERMIN?????? OR CALCULAT???? OR FIND??? OR COMPUTE
              OR COMPUTES OR COMPUTED OR COMPUTING OR MEASUR? OR DEFIN??? -
             OR DERIV???)
S7     990498   DIVID??? OR DIVISION OR MOD
S8       7438   TMAX OR T()MAX
S9         11   S4 AND S5:S6
S10         7   RD  (unique items)
S11        28   S2 AND S4
S12        18   RD  (unique items)
S13        18   S10 OR S12
S14       687   S3 AND S5:S6
S15         9   S14 AND S7:S8
S16         5   RD  (unique items)
S17        23   S13 OR S16
? t/5/all
```

17/5/1   (Item 1 from file: 8)
DIALOG(R)File   8:Ei Compendex(R)

09703356   E.I. No: EIP04058000909
Title: A note on a due-date assignment on a two-machine flow-shop
Author: Birman, Motty; Mosheiov, Gur
Corporate Source: Department of Statistics School of Business Administration The Hebrew University, Mount Scopus, Jerusalem 91905, Israel
Source: Computers and Operations Research v 31 n 3 March 2004. p 473-480
Publication Year: 2004
CODEN: CMORAP   ISSN: 0305-0548
Language: English
Document Type: JA; (Journal Article)   Treatment: T; (Theoretical)
Journal Announcement: 0402W2
Abstract: We address a due-date assignment and scheduling problem in a two-machine flow-shop setting. Our objective is to find both the job schedule and the common due-date which minimize maximum earliness, tardiness and due-date costs. We introduce an efficient (O(n**2 log n)) solution, based on repetitive use of the well-known Johnson **Algorithm** . Careful determination of the due-date in the course of sales negotiations with a customer is clearly an **important** **task** for the **firm** . A late

due - date reflects a lower service level and incurs an obvious penalty for the supplier. For a given due-date, there are penalties associated with jobs completed early or late. This paper addresses a Just-In-Time scheduling problem incorporating all these cost components. The machine setting assumed is a two-machine flow-shop. We show that an optimal solution (i.e., both an optimal due-date value and an optimal job schedule) can be found in polynomial time. 10 Refs.
Descriptors: *Operations research; Scheduling; Costs; Problem solving; Algorithms
Identifiers: Due-date assignment; Two-machine flow-shop setting; Tardiness
Classification Codes:
912.3 (Operations Research); 912.2 (Management); 723.4 (Artificial Intelligence)
912 (Industrial Engineering & Management); 911 (Cost & Value Engineering; Industrial Economics); 723 (Computer Software, Data Handling & Applications)
91 (ENGINEERING MANAGEMENT); 72 (COMPUTERS & DATA PROCESSING)

17/5/2 (Item 2 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

07781473 E.I. No: EIP97083783591
Title: Non-preemptive scheduling of real-time periodic tasks with specified release times
Author: Khil, Ara; Maeng, Seungryoul; Cho, Jungwan
Corporate Source: Korea Advanced Inst of Science and Technology, Taejon, South Korea
Source: IEICE Transactions on Information and Systems v E80-D n 5 May 1997. p 562-572
Publication Year: 1997
CODEN: ITISEF ISSN: 0916-8532
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical)
Journal Announcement: 9710W1
Abstract: The problem of non-preemptive scheduling of real-time periodic tasks with specified release times on a uniprocessor system is known as NP-hard problem. In this paper we propose a new non-preemptive scheduling **algorithm** and a new static scheduling strategy which use the repetitiveness and the predictability of periodic **tasks** in **order** to improve schedulabilities of real-time periodic tasks with specified release times. The proposed scheduling **algorithm** schedules periodic tasks by using the heuristic that precalculates if the scheduling of the selected task leads to the case that a task misses a **deadline** when tasks are scheduled by the non-preemptive EDF algorithm. If so, it defers the scheduling of the selected task to avoid the precalculated **deadline** -missing. Otherwise, it schedules the selected task in the same way as the non-preemptive EDF algorithm. Our scheduling algorithm can always find a feasible schedule for the set of periodic tasks with specified release times which is schedulable by the non-preemptive EDF algorithm. Our static scheduling strategy transforms the problem of non-preemptive scheduling for periodic tasks with specified release times into one with same release times for all tasks. It suggests **dividing** the given problem into two subproblems, making a non-preemptive scheduling algorithm to find two feasible subschedules for the two subproblems in the forward or backward scheduling within specific time intervals, and then combining the two feasible subschedules into a complete feasible schedule for the given problem. We present the release times as a function of periods for the efficient problem **division** . Finally, we show improvements of schedulabilities of our scheduling algorithm and scheduling strategy by simulation results. (Author abstract) 22 Refs.
Descriptors: *Real time systems; Problem solving; Scheduling; Computational complexity; Algorithms; Heuristic methods; Computer simulation
Identifiers: Real time periodic tasks; Earliest **deadline** first (EDF) algorithms
Classification Codes:
912.2 (Management); 721.1 (Computer Theory, Includes Formal Logic, Automata Theory, Switching Theory, Programming Theory); 723.5 (Computer

Applications)
723 (Computer Software); 921 (Applied Mathematics); 912 (Industrial Engineering & Management); 721 (Computer Circuits & Logic Elements)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS); 91 (ENGINEERING MANAGEMENT)

17/5/3 (Item 3 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

07641432 E.I. No: EIP97033547147
Title: Transaction processing in real-time database systems
Author: Krzyzagorski, Piotr; Morzy, Tadeusz
Corporate Source: Poznan Univ of Technology, Poznan, Pol
Conference Title: Proceedings of the 1996 3rd Biennial Joint Conference on Engineering Systems Design and Analysis, ESDA. Part 7 (of 9)
Conference Location: Montpellier, Fr Conference Date: 19960701-19960704
Sponsor: ASME PD
E.I. Conference No.: 46123
Source: American Society of Mechanical Engineers, Petroleum Division (Publication) PD v 79 n 7 1996. ASME, New York, NY, USA. p 165-174
Publication Year: 1996
CODEN: ASMPEX
Language: English
Document Type: CA; (Conference Article) Treatment: G; (General Review)
Journal Announcement: 9704W4
Abstract: In the paper, the differences between real-time systems and traditional database systems are discussed. The special characteristics of real-time database systems concerning resource and transaction management is presented. Existing concurrency control algorithms for real-time database systems are briefly described. A new optimistic concurrency control algorithm for **firm deadline** real-time database systems is presented. The **algorithm** , which is an extension of the OPT-WAIT **algorithm** , dynamically adjusts a serialization **order** among conflicting **transactions** and tries to reduce the number of unnecessary restarts of transactions. (Author abstract) 39 Refs.
Descriptors: *Database systems; Real time systems; Concurrency control; Algorithms; Data acquisition
Identifiers: Real time database systems; Transaction processing
Classification Codes:
723.3 (Database Systems); 722.4 (Digital Computers & Systems); 723.2 (Data Processing)
723 (Computer Software); 722 (Computer Hardware)
72 (COMPUTERS & DATA PROCESSING)

17/5/4 (Item 4 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

07586001 E.I. No: EIP96123477644
Title: Optimal aperiodic scheduling for dynamic-priority systems
Author: Ripoll, I.; Garcia-Fornes, A.; Crespo, A.
Corporate Source: Universidad Politecnica de Valencia, Spain
Conference Title: Proceedings of the 1996 3rd International Workshop on Real-Time Computing Systems and Applications
Conference Location: Seoul, South Korea Conference Date: 19961030-19961101
Sponsor: IEEE
E.I. Conference No.: 45799
Source: Proceedings of the International Workshop on Real-Time Computing Systems and Applications/RTCSA 1996. IEEE, Piscataway, NJ, USA. p 294-300
Publication Year: 1996
CODEN: 002229
Language: English
Document Type: CA; (Conference Article) Treatment: T; (Theoretical)
Journal Announcement: 9702W3
Abstract: This paper addresses the problem of jointly scheduling tasks with both hard and soft real-time constraints. We present a new on-line aperiodic admission algorithm to be used with an optimal dynamic priority pre-emptive scheduler, such as the Earliest Deadline First (EDF) or the

Least Laxity First (LLF). The admission algorithm transforms a soft aperiodic task into a hard one by assigning a deadline. The proposed **algorithm** is shown to be optimal in terms of providing the shortest response time for soft aperiodic **tasks** among fixed and dynamic priority schedulers (assuming aperiodic **tasks** are served in a FCFS **order**), without endangering the execution of any periodic task. The paper also shows how the main results and ideas developed for the fixed priority theory can be adapted and extended for dynamic priority schedulers. The algorithm has also been extended to work with **firm** **deadline** aperiodic tasks. (Author abstract) 14 Refs.

Descriptors: *Algorithms; Real time systems; Scheduling; Constraint theory; Optimization; Online systems; Response time (computer systems)

Identifiers: Aperiodic admission algorithm; Dynamic priority systems; Earliest deadline first; Least laxity first

Classification Codes:

723.2 (Data Processing); 722.4 (Digital Computers & Systems); 721.1 (Computer Theory, Includes Formal Logic, Automata Theory, Switching Theory, Programming Theory); 921.5 (Optimization Techniques)

723 (Computer Software); 722 (Computer Hardware); 721 (Computer Circuits & Logic Elements); 921 (Applied Mathematics)

72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

17/5/5 (Item 5 from file: 8)

DIALOG(R)File 8:Ei Compendex(R)

07127976 E.I. No: EIP95042656815

Title: Optimistic priority-based concurrency control protocol for firm real-time database systems

Author: Kim, Jinhwan; Shin, Heonshik

Corporate Source: Seoul Natl Univ, Seoul, S Korea

Source: Information and Software Technology v 36 n 12 Dec 1994. p 707-715

Publication Year: 1994

CODEN: ISOTE7 ISSN: 0950-5849

Language: English

Document Type: JA; (Journal Article) Treatment: T; (Theoretical)

Journal Announcement: 9506W1

Abstract: This paper presents an optimistic priority-based concurrency control protocol that schedules active transactions accessing **firm** **deadline** real-time database systems. This protocol combines the forward and backward validation processes in **order** to control concurrent **transactions** with different **priorities** more effectively. For a **transaction** in the validation phase, it can be committed successfully if the serialization order is adjusted in favour of the **transactions** with higher **priority** and aborted otherwise. Thus, this protocol establishes a priority ordering technique whereby a serialization **order** is selected and **transaction** execution is forced to obey this order. This priority-based protocol addresses the problem of satisfying data consistency, with the goal being to increase the number of transactions that commit by their deadlines. In addition, for desirable real-time conflict resolution, this protocol intends to meet deadlines of higher **priority** **transactions** then lower **priority** **transactions** . (Author abstract) 17 Refs.

Descriptors: *Database systems; Concurrency control; Real time systems; Scheduling; Network protocols; Performance; Information retrieval

Identifiers: Priority ordering technique; Serialization; Conflict resolution; Criticality; Data consistency; Optimistic priority

Classification Codes:

723.3 (Database Systems); 731.3 (Specific Variables Control); 722.4 (Digital Computers & Systems); 903.3 (Information Retrieval & Use)

723 (Computer Software); 731 (Automatic Control Principles); 722 (Computer Hardware); 903 (Information Science)

72 (COMPUTERS & DATA PROCESSING); 73 (CONTROL ENGINEERING); 90 (GENERAL ENGINEERING)

17/5/6 (Item 6 from file: 8)

DIALOG(R)File 8:Ei Compendex(R)

07107306 E.I. No: EIP95032619485

Title: Deferrable server algorithm for enhanced aperiodic responsiveness

in hard real-time environments
Author: Strosnider, Jay K.; Lehoczky, John P.; Sha, Lui
Corporate Source: Carnegie Mellon Univ, Pittsburgh, PA, USA
Source: IEEE Transactions on Computers v 44 n 1 Jan 1995. p 73-91
Publication Year: 1995
CODEN: ITCOB4 ISSN: 0018-9340
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical)
Journal Announcement: 9505W2
Abstract: Most existing scheduling algorithms for hard real-time systems apply either to periodic tasks or aperiodic tasks but not to both. In practice, real-time systems require an integrated, consistent approach to scheduling that is able to simultaneously meet the timing requirements of hard **deadline** periodic tasks, hard **deadline** aperiodic (alert-class) tasks, and soft **deadline** aperiodic tasks. This paper introduces the Deferrable Server (DS) algorithm which will be shown to provide improved aperiodic response time performance over traditional background and polling approaches. Taking advantage of the fact that, typically, there is no benefit in early completion of the periodic tasks, the Deferrable Server (DS) **algorithm** assigns higher **priority** to the aperiodic **tasks** up until the point where the periodic tasks would start to miss their deadlines. Guaranteed alert-class aperiodic service and greatly reduced response times for soft **deadline** aperiodic **tasks** are **important** features of the DS **algorithm** , and both are obtained with the hard deadlines of the periodic tasks still being guaranteed. The results of a simulation study performed to evaluate the response time performance of the new algorithm against traditional background and polling approaches are presented. In all cases, the response times of aperiodic tasks are significantly reduced (often by an order of magnitude) while still maintaining guaranteed periodic task deadlines. (Author abstract) 14 Refs.
Descriptors: *Algorithms; Real time systems; Response time (computer systems); Computer simulation; Time **division** multiplexing; Performance; Optimization; Scheduling
Identifiers: Deferrable server algorithm; Aperiodiodic responsiveness; Aperiodics; Hard deadlines; Periodics; Schedulability
Classification Codes:
722.4 (Digital Computers & Systems); 723.5 (Computer Applications); 921.5 (Optimization Techniques)
723 (Computer Software); 722 (Computer Hardware); 921 (Applied Mathematics)
72 (COMPUTERS & DATA PROCESSING); 92 (ENGINEERING MATHEMATICS)

17/5/7 (Item 7 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

06565058 E.I. Monthly No: EI9303037439
Title: Data access scheduling in firm real-time database systems.
Author: Haritsa, Jayant R.; Carey, Michael J.; Livny, Miron
Corporate Source: Univ of Maryland, College Park, MD, USA
Source: Real-Time Systems v 4 n 3 Sep 1992 p 203-241
Publication Year: 1992
CODEN: RESYE9 ISSN: 0922-6443
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical); A; (Applications)
Journal Announcement: 9303
Abstract: A major challenge addressed by conventional database systems has been to efficiently implement the transaction model, which provides the properties of atomicity, serializability, and permanence. Real-time applications have added a complex new dimension to this challenge by placing deadlines on the response time of the database system. In this paper, we examine the problem of real-time data access scheduling, that is, the problem of scheduling the data accesses of real-time **transactions** in **order** to meet their deadlines. In particular, we focus on **firm** **deadline** real-time database applications, where transactions that miss their deadlines are discarded and the objective of the real-time database system is to minimize the number of missed deadlines. Within this framework, we use a detailed simulation model to compare the performance of several real-time locking protocols and optimistic concurrency control algorithms under a variety of real-time transaction workloads. The results of our

study show that in moving from the conventional database system domain to the real-time domain, there are new performance-related forces that come into effect. Our experiments demonstrate that these factors can cause performance recommendations that were valid in a conventional database setting to be significantly altered in the corresponding real-time setting. (Author abstract) refs.

Descriptors: *REAL TIME SYSTEMS; DATABASE SYSTEMS; SCHEDULING
Identifiers: REAL TIME DATABASE SYSTEMS; TRANSACTION PROCESSING
Classification Codes:
722 (Computer Hardware); 723 (Computer Software); 913 (Production Planning & Control)
72 (COMPUTERS & DATA PROCESSING); 91 (ENGINEERING MANAGEMENT)

17/5/8 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

02203186 ORDER NO: AADAA-I1440847
Investigating an efficient resource allocation protocol for the least slack time scheduling algorithm
Author: Pulikanti, Neelima
Degree: M.S.
Year: 2006
Corporate Source/Institution: Texas A&M University - Kingsville (1187)
Adviser: Donald Varvel
Source: VOLUME 45/03 of MASTERS ABSTRACTS.
PAGE 1538. 43 PAGES
Descriptors: COMPUTER SCIENCE
Descriptor Codes: 0984

Real time scheduling algorithms are **divided** into two types; fixed priority and dynamic priority. Least Slack Time (LST) is a dynamic priority-scheduling algorithm where the priorities are calculated using slacks. A lower slack results in a higher priority. There is a need for a resource allocation protocol for this type of scheduling algorithm. In Dynamic Priority Ceiling Protocol (DPCP) the priorities are calculated dynamically. Since I am used LST, the priorities are calculated based on the slacks.

I presented an implementation of DPCP using the LST scheduling algorithm. This protocol was applied to each critical section, which occurred whenever a job tries to lock a resource. The job can lock a resource or enter a critical section only when its priority is higher than the ceiling priority of the resource. The schedule resulted in fewer context switches when using LST than using Earliest **Deadline** First (EDF). DPCP prevents chained blocking and deadlock. For **calculating** the **priorities** of <italic>n</italic> **tasks** using LST, we can use the ZeST **algorithm** that uses binomial heap concept and it guaranties <italic> O(log n)</italic> operations. I have also determined that implementation of priority queues for updating the ceiling priority of the <italic>n</italic> resource results in <italic>O(log n)</italic> operations.

17/5/9 (Item 2 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

02107518 ORDER NO: AADAA-I3184633
Feedback-based task scheduling in real-time systems
Author: Lin, Suzhen
Degree: Ph.D.
Year: 2005
Corporate Source/Institution: Iowa State University (0097)
Major Professors: Manimaran Govindarasu; Brian Steward
Source: VOLUME 66/08-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 4401. 103 PAGES
Descriptors: ENGINEERING, ELECTRONICS AND ELECTRICAL
Descriptor Codes: 0544
ISBN: 0-542-26163-4

Real-time computing is an enabling technology for many current and next generation applications. One of the key components of real-time

systems is the scheduling of tasks, the objective of which is to meet task deadlines predictably. Traditional real-time task scheduling paradigms perform well in static or dynamic systems in which the workload can be accurately modeled. Unfortunately, in many complex applications, unpredictable dynamic factors exist due to which precise workload characterization is difficult. In recent years, feedback control techniques have been successfully applied to address the issue of unpredictable workload in computing systems. In this dissertation, we develop feedback-based algorithms and analysis for some important dynamic scheduling problems in real-time systems.

First, we address the problem of selective herbicide spraying in precision farming application. The goal is to achieve low weed miss ratio and high CPU utilization. We carry out system identification, vehicle modeling and controller design. In our design, the requested CPU utilization is fed back and the vehicle speed is controlled. The system model is verified and performance evaluation is carried out through simulation studies.

The second problem is task scheduling based on (<italic>m, k</italic>)- **firm** **deadline** constraints in real-time systems. The proposed solution feeds back the current dynamic failure rate (<italic>DFR</italic>) and adjusts the task's QoS based on <italic>DFR</italic> on-line. We also propose a novel fairness metric to evaluate the fairness in QoS among tasks achieved by the scheduler. The simulation results show that the QoS of tasks can be improved significantly while keeping the <italic>DFR</italic> below a certain threshold.

The third problem is combined task scheduling with fault tolerance in real-time systems. In our model, the rate monotonic scheduling algorithm and deferrable server algorithm are used to schedule periodic and aperiodic tasks, respectively. By using feedback control technique, we adjust the capacity of the deferrable servers based on the failure **rate** of the periodic **tasks** . The performances of the systems are evaluated through simulation studies.

The last problem is task scheduling in distributed real-time systems. We propose a double-loop scheme to keep the deadline miss ratio close to the set point and maximize the CPU utilization, and analyze the stability of the system in Z-domain. We also propose a global scheduling method to achieve load balancing by using a suitable load index. The performances of the systems are evaluated through simulation studies.

The feedback-based solutions proposed in this dissertation are based on the principle of controlling the trade-off between deadline miss ratio and resource utilization. This idea can be adapted not only to other scheduling problems in real-time systems, but also to scheduling problems in non-real-time systems.

17/5/10 (Item 3 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

02096761 ORDER NO: AADAA-I1427347
Online assignment of firm aperiodic tasks using least slack time first (LST) priority
Author: Viswanath, Parimalam
Degree: M.S.
Year: 2005
Corporate Source/Institution: Texas A&M University - Kingsville (1187)
Chairman: Donald Varvel
Source: VOLUME 44/01 of MASTERS ABSTRACTS.
PAGE 413. 56 PAGES
Descriptors: COMPUTER SCIENCE
Descriptor Codes: 0984
ISBN: 0-542-18186-X

Research has been conducted on analyzing the online scheduling of aperiodic tasks with offline scheduled periodic task systems, based on Earliest Deadline First (EDF) [1], extending EDF [2] and using Optimal Priority Assignment method [3]. An acceptance test is performed in **order** to **determine** if the aperiodic **task** to be scheduled can be accepted or not. Research into on-line acceptance tests has been carried out by Chetto and Chetto [4], Schwan and Zhou [5] and Kim [6] with respect to EDF scheduling. Other examples include aperiodic response-time minimization [7], slack stealing [8] and the reservation-based (RB) algorithm [9]. These

scheduling algorithms work on scheduling aperiodic tasks with an offline schedule of periodic tasks. They use either EDF (Earliest Deadline First) or RM (**Rate** Monotonic) **algorithm** to schedule the **tasks** , after the aperiodic task has been accepted.

The Online-Offline scheduling method introduced here allocates aperiodic task with arbitrary release time and **firm** **deadline** on a uniprocessor along with a set of aperiodic tasks and one-shot tasks that have been previously scheduled using a guaranteed offline scheduler. This method uses <italic> Least Slack Time First</italic> (<italic>LST</italic>) **algorithm** to assign **priority** to the **tasks** , once the online tasks have been accepted.

17/5/11 (Item 4 **from file: 35**)
DIALOG(R)File 35:Dissertation Abs Online

01848172 ORDER NO: AADAA-I3023379
The effect of task **structure and** task order **on subjective distress and dilatory behavior in academic procrastinators**
Author: Holmes, Richard Alan
Degree: Ph.D.
Year: 2000
Corporate Source/Institution: Hofstra University (0086)
Sponsor: Junko Tanaka-Matsumi
Source: VOLUME 62/08-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 3803. 77 PAGES
Descriptors: PSYCHOLOGY, CLINICAL ; EDUCATION, EDUCATIONAL PSYCHOLOGY
Descriptor Codes: 0622; 0525
ISBN: 0-493-34851-4

The current study tested aspects of Solomon & Rothblum (1983) avoidance model of procrastination, and examined the effect of **task** structure and **task** **order** on subjective distress, negative self-statements, task performance, and dilatory behavior in academic procrastinators. Forty-six high procrastinators and 46 low procrastinators, who were selected using the Aitken Procrastination Inventory, responded to a series of evaluative academic tasks, within a limited period of time (two approximately 30 minute sessions, Part I), and extended period of time (2 weeks, Part II). Participants first completed self-report measures of trait anxiety (STAI) and depression (BDI). Dependent measures included two behavioral measures of procrastination: latency to begin, and duration of time to complete the tasks. Participants also completed ratings of subjective units of distress (SUDS) and a measure of negative self-statements twice during the experiment.

In Part II, participants were asked to complete and return a one page paper take home assignment as soon as possible with a **final** **deadline** of two weeks. Procrastination was measured by the number of days they took to return the take home assignment. Two independent raters evaluated the quality of participants' work.

On behavioral measures of procrastination, high and low procrastinators did not differ in latency to begin the specific tasks. However, high procrastinators took a significantly greater duration of time by 19% to complete the tasks than low procrastinators did. Unexpectedly, high and low procrastinators were found to take a significantly greater latency to begin and duration of time to complete structured vs unstructured tasks. High procrastinators also took significantly more time by 29% to complete and return the one page take home assignment than low procrastinators, despite showing no difference in the quality of their work.

These results in part supported the current model of procrastination that high procrastinators harbor more emotional distress than low procrastinators and engage in more dilatory behavior. High procrastinators reported significantly more anxiety and depression than low procrastinators did on the STAI and BDI before the study began, and reported more subjective distress on the SUDS and negative self-statements when faced with evaluative academic tasks during the experiment.

17/5/12 (Item 5 **from file: 35**)
DIALOG(R)File 35:Dissertation Abs Online

01755116 ORDER NO: AADAA-I9978574
Maintaining logical and temporal consistency in time critical databases
Author: Xiong, Ming
Degree: Ph.D.
Year: 2000
Corporate Source/Institution: University of Massachusetts Amherst (0118)
Director: Krithi Ramamritham
Source: VOLUME 61/07-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 3702. 147 PAGES
Descriptors: COMPUTER SCIENCE
Descriptor Codes: 0984
ISBN: 0-599-84522-8

Whereas transaction processing under deadline constraints has been the main focus of prior real-time database research, in this thesis, we focus on issues raised by the presence of temporal data and replicated data. In particular, we study the problem of data consistency maintenance and transaction scheduling in real-time databases dealing with temporal data and replicated data.

Unlike traditional real-time databases, timing constraints of transactions operating with temporal data quite often have their origins in the temporal properties of the data. Such data is sampled periodically and usable only within certain time limits. It is a very **important task** of a real-time database to satisfy the temporal consistency of data. Therefore we have investigated two specific problems for real-time transactions dealing with temporal data: (a) given transactions with deadlines, and given the temporal properties of the data, how should transactions be processed so that they are not aborted for lack of temporally valid data; (b) how should deadlines and periods (for transactions that update the database) be assigned so that temporal validity of data is maintained while the load imposed by the transactions is minimized. To address problem (a) the concept of data-deadline is developed, and time cognizant transaction scheduling algorithms based on data-deadline, forced wait and similarity protocols are proposed. It is shown that these algorithms produce considerable performance improvement. To address problem (b) a novel approach, More-Less, is proposed. Our analysis and experiments show that More-Less can provide better schedulability and reduce update transaction workload while guaranteeing data timing constraints.

We then investigated the problem of replicated data consistency in distributed real-time databases. Data replication can help database systems meet the stringent temporal constraints of current real-time applications. In this thesis, we present MIRROR, a concurrency control protocol specifically designed for **firm - deadline** applications operating on replicated real-time databases. MIRROR augments the classical O2PL concurrency control protocol with a novel state-based real-time conflict resolution mechanism. Our performance studies show that MIRROR provides the best performance in both fully and partially replicated environments for real-time applications with moderate update frequencies.

17/5/13 (Item 6 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01704893 ORDER NO: AAD99-29989
REAL-TIME PERFORMANCE GUARANTEES IN MANUFACTURING SYSTEMS (DEADLINE GUARANTEE, SCHEDULING, RATE MONOTONIC)
Author: ZHOU, LEI
Degree: PH.D.
Year: 1999
Corporate Source/Institution: THE UNIVERSITY OF MICHIGAN (0127)
Co-chairs: KANG G. SHIN; ELKE A. RUNDENSTEINER
Source: VOLUME 60/05-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 2221. 187 PAGES
Descriptors: COMPUTER SCIENCE ; ENGINEERING, INDUSTRIAL
Descriptor Codes: 0984; 0546

Most research in real-time scheduling theory assumes idealized system conditions. The issues that can arise in applying the theory to real-world applications remain largely unaddressed, which are the focus of this thesis. In particular, we develop practical approaches for hard and

probabilistic deadline guarantees in the presence of real-time operating system (RTOS) unpredictability, such as timer interval and task execution time variations. Our target application domain is open-architecture machine tool controllers.

Rate-monotonic (RM) has been proven to be an optimal fixed-priority scheduling algorithm for periodic hard real-time tasks. However, given RTOS unpredictability, the periodicity model of the original RM scheduling theory is no longer true. In order to provide hard deadline guarantees, we introduce an empirical **task** schedulability model, called <italic> **Rate** -Monotonic in the presence of Timing Unpredictability</italic> (RMTU) to augment the RM theory to handle RTOS unpredictability. The model parameters can be determined systematically and empirically. Our experimental measurements confirm the validity of RMTU.

While hard real-time tasks require **absolute** **deadline** guarantees, others may be able to tolerate some deadline misses. For non-hard real-time tasks that still require a certain level of performance, we develop a practical framework for probabilistic deadline guarantees. The first component of this framework is the <italic>Probabilistic Real-Time Constraint Model</italic> (PRTCM), with which the tolerance of application task deadline misses can be specified in terms of <italic>completion probability</italic>. The second component consists of two classes of new scheduling algorithms: completion-probability-cognizant and CPU-utilization-cognizant heuristics. Our comparative study of these heuristics and scheduling algorithms RM, earliest-deadline-first, and first-in-first-out demonstrates the superior performance of some new heuristics under certain load conditions.

The last component of the framework is the <italic>Measurement-Based Simulation Technique</italic> (MBST). It uses individual application task execution times (measured in isolation) as inputs, models task interaction and system overhead, and generates task completion time distributions to determine whether probabilistic deadline guarantees can be made. Applying MBST to our prototype open-architecture milling machine controllers, MBST is shown to produce simulation results that match very well the actual measurements. It can also be used to predict the performance of tasks that have not yet been fully implemented.

Finally, we evaluate real-time application development strategies to minimize the impact of RTOS unpredictability. We build a prototype modular controller for a milling machine in the University of Michigan Open-Architecture Controller (UMOAC) testbed. To improve its performance, we experiment with the strategy that tunes the computer system environment for the given application, as well as the strategy that attempts to optimize the structure of the application software itself. Our measurement data show that, while both strategies are effective, the latter produces better results.

17/5/14 (Item **7** from file: **35**)

01663895 ORDER NO: AAD99-04126
STATISTICAL RATE MONOTONIC SCHEDULING: QUALITY OF SERVICE THROUGH THE MANAGEMENT OF VARIABILITY IN REAL-TIME SYSTEMS (RESOURCE ALLOCATION)

Author: ATLAS, ALIA K.
Degree: PH.D.
Year: 1999
Corporate Source/Institution: BOSTON UNIVERSITY (0017)
Major Professor: AZER BESTAVROS
Source: VOLUME 59/08-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 4233. 182 PAGES
Descriptors: COMPUTER SCIENCE ; ENGINEERING, SYSTEM SCIENCE
Descriptor Codes: 0984; 0790

Interest in real-time scheduling increases as applications with quality of service (QoS) and timeliness constraints proliferate. The classical real-time **task** model, used in the optimal **Rate** Monotonic Scheduling (RMS), assumes constant resource requirements and hard deadlines. For the many applications with variable resource requirements, RMS uses pessimistic worst-case values and results in severe resource underutilization. To eliminate such underutilization, this dissertation examines how the variability of resource requirements should be considered in the problem of scheduling periodic tasks with statistical QoS

constraints on the percentage of missed deadlines. To solve this problem, two on-line algorithms and an oracle are introduced, simulated and evaluated using two novel metrics. To show applicability, a computer-aided design tool and a design and implementation in KURT Linux are presented.

The primary contribution, Statistical Rate Monotonic Scheduling (SRMS), is proposed with associated analysis for the calculation of statistical QoS guarantees and, given QoS requirements, proper resource allocation. SRMS assumes that variability can be smoothed through aggregation. It consists of a QoS calculator, a feasibility test, a scheduler and a constant-time job admission controller. Extensions provide time aggregation across tasks and a second chance for rejected jobs.

Additional algorithms--Slack Stealing Job Admission Control (SSJAC) and an omniscient off-line oracle--are introduced to permit comparison of SRMS with previous research and with theoretical performance bounds. Different value functions enable the oracle to yield solutions optimal according to different metrics--completion count, effective processor utilization (EPU), and **job failure rate** (JFR). The value function for the latter is introduced to provide a metric which considers all tasks of equal value.

Via simulation, the performance of the algorithms is examined with JFR, EPU and two novel metrics. ΔQoS evaluates the accuracy of QoS calculations. Intertask unfairness evaluates how unfair an **algorithm** is to different **priority tasks** . Experiments show that SRMS has superior performance during overload when the adjacent period ratio is at least two.

To facilitate application development, the SRMS Workbench, a computer-aided design tool and simulator, and a design and implementation of SRMS in KURT Linux are provided. An API is introduced to support soft/ **firm - deadline** and design-to-time tasks. The SRMS Workbench implements simple QoS negotiation and calculation of system specifications for requested QoS.

17/5/15 (Item 8 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01413944 ORDER NO: AADAA-I9517102
BACKWARD SIMULATION FOR PRODUCTION SCHEDULING PURPOSES (JOB SHOP SCHEDULING, SCHEDULING)
Author: YING, CHEN-TSAU CHRIS
Degree: PH.D.
Year: 1994
Corporate Source/Institution: THE OHIO STATE UNIVERSITY (0168)
Adviser: GORDON M. CLARK
Source: VOLUME 56/01-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 452. 214 PAGES
Descriptors: ENGINEERING, INDUSTRIAL; BUSINESS ADMINISTRATION, MANAGEMENT
Descriptor Codes: 0546; 0454

Order release is an **important job** shop scheduling function that plans and controls the release of jobs to the shop floor. Deterministic simulation has been proposed to determine order release times with either a forward or backward approach. We investigate the feasibility and performance of several different backward simulation approaches for job shop scheduling purposes. First, we specify a job shop scheduling simulation model using DEVS formalism. We show that the inverse of the transition function is not well defined if a queue is present.

Next, we show that backward simulations often introduce some arbitrary machine idle times. We develop a backward simulation algorithm that starts from job due dates and represents the forward FIFO sequencing rule when we augment some job processing times to keep machines busy during the arbitrary machine idle times. This procedure performs well in terms of mean flow time and mean **absolute** deviation from **due date** when the job shop is not heavily congested and jobs have different due dates.

We then develop a two-pass algorithm that starts with a modified backward algorithm and ends with a forward simulation. This procedure yields significantly better mean flow time than the single-run forward simulation. The procedure also improves the mean flow time and the mean tardiness measure of the single-run backward simulation for heavily congested shop cases.

Finally, we develop a bi-directional simulation algorithm that starts

and ends with a forward simulation run. The algorithm includes a number of additional reversed and forward runs in between the first and last runs. The reversed run is essentially a forward simulation performed on a reversed problem formulation. The algorithm improves the mean flow time significantly for all scenarios we tested, and the mean tardiness measure is also improved in most cases. Since this algorithm does not require job due date information, its effectiveness remains the same whether jobs have a common due date or various due dates.

17/5/16 (Item 9 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01235987 ORDER NO: NOT AVAILABLE FROM UNIVERSITY MICROFILMS INT'L.
SEQUENCING PROBLEMS WITH DUE DATES AND SETUP TIMES (MACHINE SCHEDULING)
Author: UNAL, ALI TAMER
Degree: PH.D.
Year: 1992
Corporate Source/Institution: UNIVERSITY OF SOUTHERN CALIFORNIA (0208)
Chairman: SHU MING NG
Source: VOLUME 53/04-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 2039.
Descriptors: OPERATIONS RESEARCH
Descriptor Codes: 0796

This study considers two related single machine scheduling problems in which there are a number of part types to be processed. Two jobs are of the same part type if the machine does not require a setup in between the processing of these jobs. Otherwise, it requires a significant setup.

In this setting, the first problem of concern is the Feasibility Problem which can be defined as follows: Given a set of production orders with due dates, is it possible to fulfill all the orders on time? In this study, a set of feasibility conditions are derived which characterize the feasible schedules. Later, a heuristic and an exact algorithm are developed to solve the problem. Both algorithms are designed to make use of the feasibility conditions. The heuristic algorithm is tested using randomly generated problems.

The second set of problems is concerned with the due date determination decision. It is assumed that the facility has a number of jobs with preassigned due dates scheduled so that none are tardy. The objective is to assign due dates to a set of newly arrived **jobs** so that total **weighted** due date or **maximum due date** is minimized and a schedule where no job is tardy can be generated.

The first due date determination problem considered is the Insertion Problem, where we assume that the initial sequence of the existing jobs in the facility is not to be disrupted. The complexity of a set of special cases is examined and dynamic programming formulations and heuristics with data-dependent worst-case error bounds are provided for the NP-hard case. Computational analysis of the heuristics is also reported.

In the second problem (Merging Problem), the constraint of preserving the initial sequence is relaxed. In this case, the problem is shown to be NP-hard. A set of optimality conditions are developed and they have been implemented as fathoming rules in a branch and bound algorithm. Also, a lower bound for the problem is defined. Computational analysis are performed to see the effectiveness of the fathoming rules and the lower bound. (Copies available exclusively from Micrographics Department, Doheny Library, USC, Los Angeles, CA 90089-0182.)

17/5/17 (Item 10 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01208718 ORDER NO: AAD91-34322
TRANSACTION SCHEDULING IN FIRM REAL-TIME DATABASE SYSTEMS (FIRM DEADLINES)
Author: HARITSA, JAYANT RAMASWAMY
Degree: PH.D.
Year: 1991
Corporate Source/Institution: THE UNIVERSITY OF WISCONSIN - MADISON (0262)
Supervisor: MIRON LIVNY

Source: VOLUME 52/10-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 5366. 202 PAGES
Descriptors: COMPUTER SCIENCE
Descriptor Codes: 0984

A growing number of database applications are having to meet real-time requirements. These timing requirements may be expressed at the database system interface by assigning completion deadlines to transactions. In this thesis, we study the problem of transaction scheduling in database systems supporting such real-time applications. In particular, we focus on applications with **firm** deadlines. **Firm - deadline** applications consider transactions that do not complete by their deadlines to be worthless and therefore discard late transactions. Within the **firm - deadline** context, two cases that differ in the utility associated with completing a transaction before its deadline are examined here. In the same-value case, all transactions have equal utility from the application's perspective and the goal of the real-time database system is to maximize the number of in-time transactions. In the multiple-value case, different transactions have different utilities to the application and the goal of the real-time database system is to maximize the total value of the in-time transactions.

In this thesis, we present new real-time concurrency control protocols and **priority** assignment policies for **transaction** scheduling in the same-value and the multiple-value cases. The concurrency control protocols are based on the optimistic approach to maintaining database consistency. The priority policies are based on simple real-time scheduling observations and adapt their priority assignment to match the database operating environment. Results from a wide range of simulation experiments indicate that the real-time optimistic concurrency control protocols are fundamentally better suited than their locking-based counterparts to the **firm - deadline** environment. The results also show that the adaptive priority policies provide better performance than fixed priority policies. In particular, for the multiple-value case, priority policies that adaptively change the relative **importance** of **transaction** values and deadlines deliver considerably better performance than policies that establish fixed tradeoffs between these characteristics.

In summary, this thesis sheds light on issues involved in real-time transaction scheduling, and presents new scheduling algorithms that come closer to meeting the challenges of the real-time domain.

17/5/18 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

08210490 INSPEC Abstract Number: C2002-04-4240-010
Title: On-line scheduling with tight deadlines
Author(s): Chiu-Yuen Koo; Tak-Wah Lam; Tsuen-Wan Ngan; Kax-Keung To
Author Affiliation: Dept. of Comput. Sci., Hong Kong Univ., China
Conference Title: Mathematical Foundations of Computer 2001. 26th International Symposium, MFCS 2001. Proceedings (Lecture Notes in Computer Science Vol.2136) p.464-73
Editor(s): Sgall, J.; Pultr, A.; Kolman, P.
Publisher: Springer-Verlag, Berlin, Germany
Publication Date: 2001 Country of Publication: Germany xii+716 pp.
ISBN: 3 540 42496 2 Material Identity Number: XX-2000-03186
Conference Title: Proceedings of 26th International Symposium on Mathematical Foundations of Computer Science
Conference Date: 27-31 Aug. 2001 Conference Location: Marianske Lazne, Czech Republic
Language: English Document Type: Conference Paper (PA)
Treatment: Theoretical (T)
Abstract: This paper is concerned with the on-line problem of scheduling jobs with tight deadlines in a single-processor system. It has been known for long that in such a setting, no on-line algorithm is optimal (or 1-competitive) in the sense of matching the optimal off-line algorithm on the total value of jobs that meet the deadlines; indeed, no **algorithm** can be Omega (k)-competitive, where k is the **importance** ratio of the jobs . Recent work, however, reveals that the competitive ratio can be improved to O(1) if the on-line scheduler is equipped with a processor O(1) times faster; furthermore, optimality can be achieved when using a processor O(log k) times faster. This paper presents a new on-line algorithm for scheduling jobs with tight deadlines, which can achieve optimality when

using a processor that is only O(1) times faster. (13 Refs)
Subfile: C
Descriptors: competitive algorithms; processor scheduling; real-time systems; scheduling
Identifiers: on-line problem; scheduling jobs; single-processor system; scheduling; tight deadlines; **firm deadline** scheduling; competitive algorithm
Class Codes: C4240 (Programming and algorithm theory); C6150N (Distributed systems software)

17/5/19 (Item 2 from file: 2)
DIALOG(R)File 2:INSPEC

06650607 INSPEC Abstract Number: C9709-6160-017
Title: Optimistic **concurrency control algorithm with dynamic serialization adjustment for** firm deadline **real-time database systems**
Author(s): Krzyzagorski, P.; Morzy, T.
Author Affiliation: Inst. of Comput. Sci., Poznan Univ. of Technol., Poland
Conference Title: Advances in Databases and Information Systems. Proceedings of the Second International Workshop on Advances in Databases and Information Systems (ADBIS'95) p.27-42
Editor(s): Eder, J.; Kalinichenko, L.A.
Publisher: Springer-Verlag, Berlin, Germany
Publication Date: 1996 Country of Publication: Germany ix+498 pp.
ISBN: 3 540 76014 8 Material Identity Number: XX96-03434
Conference Title: Proceedings of the Second International Workshop on Advances in Databases and Information Systems
Conference Date: 27-30 June 1995 Conference Location: Moscow, Russia
Language: English Document Type: Conference Paper (PA)
Treatment: Practical (P)
Abstract: A new optimistic concurrency control **algorithm** for **firm deadline** real-time database systems is presented. The **algorithm** dynamically adjusts a serialization **order** among conflicting **transactions** and, thus, tries to reduce the number of unnecessary restarts of **transactions** . Instead of aborting a lower **priority transaction** being in conflict with already committed higher **priority transaction** the **algorithm** is looking for a new serialization order, i.e. it tries to serialize the transaction before the conflicting one. Through simulation experiments, we evaluate the performance of the algorithm, and compare the algorithm with two well-known optimistic concurrency control algorithms: OCC and OPT-BC. Experimental results have shown that the performance of the algorithm depends on a system workload. The probability of successful reordering of conflicting transactions decreases with the increasing number of conflicts between the transactions. (17 Refs)
Subfile: C
Descriptors: concurrency control; database management systems; real-time systems
Identifiers: optimistic concurrency control algorithm; dynamic serialization adjustment; **firm deadline** real-time database systems; serialization order; conflicting transactions; simulation experiments; performance; OCC; OPT-BC
Class Codes: C6160 (Database management systems (DBMS)); C6150J (Operating systems)

17/5/20 (Item 3 from file: 2)
DIALOG(R)File 2:INSPEC

05849865 INSPEC Abstract Number: C9502-4250-008
Title: Optimistic **priority-based concurrency control** protocol for **firm real-time database systems**
Author(s): Jinhwan Kim; Heonshik Shin
Author Affiliation: Res. Inst. of Advanced Comput. Technol., Seoul Nat. Univ., South Korea
Journal: Information and Software Technology vol.36, no.12 p.707-15

Publication Date: Dec. 1994 Country of Publication: UK
CODEN: ISOTE7 ISSN: 0950-5849
U.S. Copyright Clearance Center Code: 0950-5849/94/012707-09$10.00
Language: English Document Type: Journal Paper (JP)
Treatment: Theoretical (T)
Abstract: Presents an optimistic priority-based concurrency control protocol that schedules active transactions accessing **firm - deadline** , real-time database systems. This protocol combines forward and backward validation processes in **order** to control concurrent **transactions** with different **priorities** more effectively. A **transaction** in the validation phase can be committed successfully if the serialization order is adjusted in favour of the **transactions** with higher **priority** and aborted otherwise. Thus, this protocol establishes a priority ordering technique whereby a serialization **order** is selected and the **transaction** execution is forced to obey this order. This priority-based protocol addresses the problem of satisfying data consistency, with the goal being to increase the number of transactions that commit by their deadlines. In addition, for desirable real-time conflict resolution, this protocol is intended to meet more deadlines of higher **priority** **transactions** than of lower **priority** **transactions** . (17 Refs)
Subfile: C
Descriptors: access protocols; concurrency control; data integrity; database theory; real-time systems; transaction processing
Identifiers: optimistic priority-based concurrency control protocol; real-time database systems; deadlines; active transaction scheduling; forward validation processes; backward validation processes; **transaction** **priorities** ; validation phase; commitment; serialization order; priority ordering technique; transaction execution; data consistency; real-time conflict resolution; criticality
Class Codes: C4250 (Database theory); C5640 (Protocols)

17/5/21 (Item 1 from file: 144)
DIALOG(R)File 144:Pascal

17524705 PASCAL No.: 06-0111210
An efficient scheduling algorithm for real-time traffic on WDM passive star optical networks
XIAOHONG HUANG; MAODE MA
School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore 639798, Singapore
Journal: Journal of lightwave technology, 2005, 23 (11) 3683-3695
ISSN: 0733-8724 CODEN: JLTEDG Availability: INIST-20142; 354000134572480270
No. of Refs.: 14 ref.
Document Type: P (Serial) ; A (Analytic)
Country of Publication: United States
Language: English
One of the major challenges in the design of future-generation high-speed networks is the provision of quality-of-service (QoS) to real-time traffic. In this paper, we propose a novel scheduling scheme, namely differentiated dropping scheduling (DDS), which is designed to handle real-time traffic in passive star-coupled wavelength **division** multiplexing (WDM) optical networks. By taking channel and destination availability into account, DDS can dramatically improve network performance in terms of message loss rate. Moreover, this scheme has the capacity of preventing channel collision and destination conflict. In order to evaluate the proposed DDS algorithm, extensive discrete-event simulations and mathematical performance comparison are conducted by comparing its performance with Moore and Hodgson's algorithm and the earliest- **due - date** (EDD) algorithm. The results show that DDS can achieve the best performance among the three algorithms.

English Descriptors: Algorithm performance; Scheduling; Real time processing; Teletraffic; Wavelength **division** multiplexing; Passive optical network; Optical fiber network; Service quality; Direct digital synthesis; Digital synthesizer; Frequency synthesizer; Telecommunication network; Optical telecommunication; Availability; Performance evaluation; Information loss; Loss **rate** ; Channel capacity; **Algorithm** ; Discrete event system; Mathematical simulation; Optical fiber communication

French Descriptors: Performance algorithme; Ordonnancement; Traitement temps reel; Teletrafic; Multiplexage longueur onde; Reseau optique passif ; Reseau fibre optique; Qualite service; Synthese numerique directe; Synthetiseur numerique; Synthetiseur frequence; Reseau telecommunication; Telecommunication optique; Disponibilite; Evaluation performance; Perte information; Taux perte; Capacite canal; Algorithme; Systeme evenement discret; Simulation mathematique; Communication fibre optique

Classification Codes: 001D04B02B; 001D04A04G; 001D04B08A; 001D04B02E

17/5/22 (Item 1 from file: 99)
DIALOG(R)File 99:Wilson Appl. Sci & Tech Abs

1143815 H.W. WILSON RECORD NUMBER: BAST94012368
Rate-monotonic analysis for real-time industrial computing
Klein, Mark H; Lehoczky, John P; Rajkumar, Ragunathan
Computer v. 27 (Jan. '94) p. 24-33
DOCUMENT TYPE: Feature Article ISSN: 0018-9162 LANGUAGE: English
RECORD STATUS: New record

ABSTRACT: An analysis methodology for managing real-time requirements in a distributed industrial computing situation is presented. A comprehensive robotics example taken from a typical industrial application shows the application of the generalized, rate-monotonic scheduling theory. The system must guarantee that each task on each node meets its **deadline** and that system-level timing constraints are satisfied. A **divide** -and-conquer approach is used to understand and control the rate-monotonic application's timing behavior. The rate-monotonic scheduling **algorithm** can be extended to provide excellent response times to aperiodic tasks; analyze loss in schedulable utilization; ensure the most **important** **tasks** meet their timing requirements in cases of transient overload; extend the processor scheduling theory to communication subsystems; develop a theory of predictable mode changes; incorporate rate-monotonic-scheduling support into Ada, Posix, and Futurebus+; and solve other practical problems.
DESCRIPTORS: Real time scheduling; Real time robotic control; **Divide** and conquer algorithms;

17/5/23 (Item 1 from file: 95)
DIALOG(R)File 95:TEME-Technology & Management

00520919 E92014111007
Transaction scheduling in firm real-time database systems
(Tranaktionsplanung in festen Echtzeit-Datenbanksystemen)
anonym
Univ. of Wisconsin, Madison, USA
Computer Sciences Technical Report, University of Wisconsin, Computer Sciences Department, v47, n398, pp1-149, 1991
Document type: Report Language: English
Record type: Abstract

ABSTRACT:
Database applications that arise in the real-time domain have to meet timing requirements. At the database system interface, these timing requirements may translate into completion deadlines. In particular, we focus on applications with firm deadlines, which consider transactions that do not complete by their deadlines to be worthless and therefore discard late transactions that do not complete by their deadlines to be worthless and therefore discard late transactions. Within the **firm - deadline** context, two cases that differ in the utility associated with completing a transaction before its deadline are examined here. In the same-value case, all transactions have equal utility from the application's perspective and the goal of the real-time database system is to maximize the number of in-time transactions. In the multiple-value case, different transactions have different utilities to the application and the goal of the real-time database system is to maximize the total value of the in-time transactions.

In this thesis, we present new real-time concurrency control protocols and priority assignment policies for transaction scheduling in the same-value and the multiple-value cases. The concurrency control protocols are based on the optimistic approach to maintaining database consistency. The priority policies are based on simple real-time scheduling observations and adapt their priority assignment to match the database operating environment. Results from a wide range of simulation experiments indicate that real-time optimistic concurrency control protocols are fundamentally better suited than their locking-based counterparts to the firm - deadline environment. The results also show that adpative priority policies provide superior performance to fixed priority policies. In particular, for the multiple-value case, priority policies that adpatively change the relative importance of transaction values and deadlines deliver considerably better performance than policies that establish fixed tradeoffs between these characteristics.

DESCRIPTORS: DATA BANK; DATABASE MANAGEMENT SYSTEM; REAL TIME METHOD; PROTOCOLS; COMPUTER INTERFACES; PARALLEL PROCESSING; BUSINESS PROCESS
IDENTIFIERS: TRANSAKTIONSPLANUNG; DEADLINE; Datenbank; Echtzeitbetrieb; Deadline

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             ING OR SORT??? OR ORDER???)
S3      18281   DEADLINE OR DUE()DATE
S4        207   (MAX OR MAXIMUM OR ABSOLUTE OR FINAL OR FINALE OR LAST OR -
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S15         9   S14 AND S7:S8
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     $1.86  TELNET
   $203.59  Estimated cost this search
   $604.07  Estimated total session cost  38.215 DialUnits

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